Vol. 10, No. 5

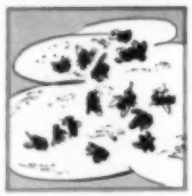
MAY, 1955

AGRICULTURAL CHEMICALS

FLY FLAKES

kills 'em fast ...and easy!

merely 1 scatter by hand



watch 'em 2 die

sweep 'em 3 up

The new, improved FLY FLAKES

- *Kill flies in minutes*
- *Kill resistant strains*
- *Kill maggots*
- *Are economical-to-use*
- *For dairy barns, feed rooms, poultry houses, manure piles, outside areas.*

FLY FLAKES, outstanding last year, are even more potent this year. The new, improved FLY FLAKES are the simplest, most effective and yet the most economical control devised.

Available in 1 lb. cans; 2, 5 and 10 lb. bags, and 25 lb. drums

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OLIN MATHIESON CHEMICAL CORPORATION

Insecticides Division

ONE PARK AVE., N.Y. N.Y. • BALTIMORE 3, MD. • LITTLE ROCK, ARK.

Giant Servant of Agriculture

Time to Plant

Someone once remarked — tomorrow should be a busy day, so much has been put off until then!

Out of an entire year, there are only a few days when a farmer plants. That's why we are geared to meet our customers' immediate requirements.

P.C.A.
The SALT of the EARTH
RED MURIATE

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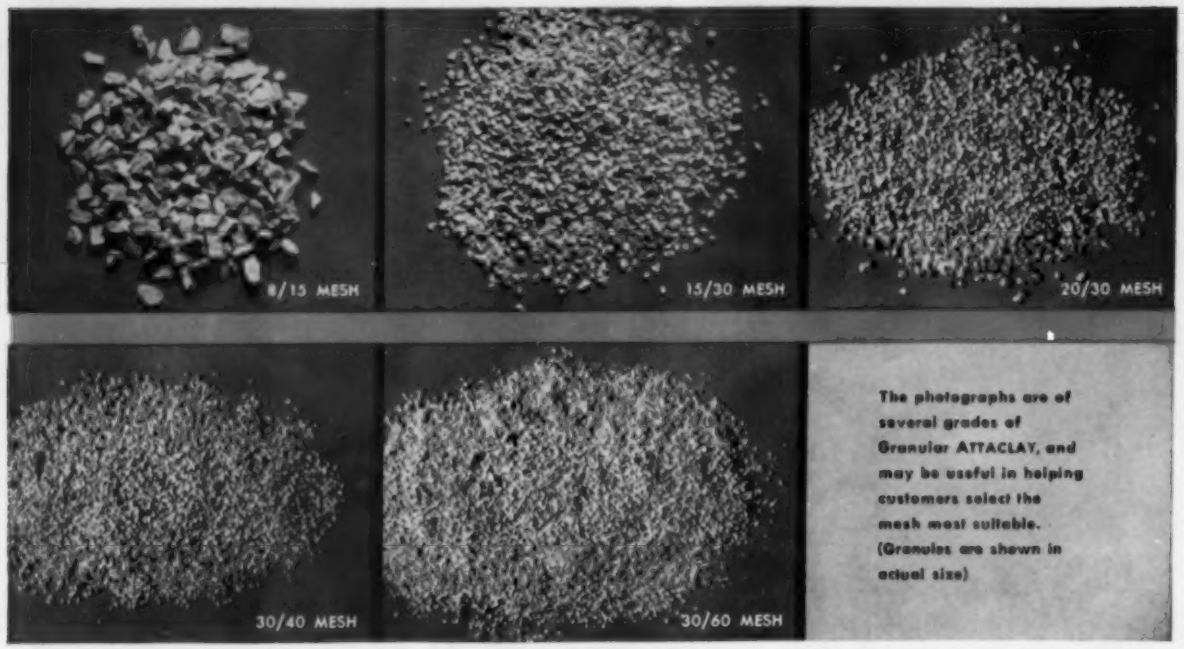
• *These five pictures may be the pattern of better business for you*


8/15 MESH
15/30 MESH
20/30 MESH
30/40 MESH
30/60 MESH
The photographs are of several grades of Granular ATTACLAY, and may be useful in helping customers select the mesh most suitable. (Granules are shown in actual size)

for GRANULAR PESTICIDES (*soil and other use**)

. . . GRANULAR ATTACLAY

If you're a processor with granular pesticides in mind, you can get going faster and keep growing steadier with Granular ATTACLAY and M & C technical help.

You Can Make A Superior Product. Granular ATTACLAY is made from the same highly sorptive material as Attaclay. It works well with toxicants . . . suffers minimum breakdown in processing . . . provides the versatile and efficient means of formulating pesticides, fungicides or herbicides.

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*Interesting New Above-The-Ground Use—Corn borer control in Iowa. Granular pesticides (from plane or ground rig) hit the host foliage, filter down and accumulate in the whorl and axial of leaves, kill the pest at point of greatest danger. (In the Gulf area, corn bud worm is controlled by the same technique.)

New 8-Page Bulletin, Technical Help, Samples. Our years of experience with granular grades may provide just the answer to your formulation, production or application problem. We urge you to check the coupon and mail it today.

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AGRICULTURAL CHEMICALS

A Monthly Magazine For the Trade

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This Month's Cover

Mr. Hayes Dever, chairman of the American Public Relations Association, and secretary and director of Public Relations of Capital Airlines Inc., presents the silver anvil of APRA to David G. Hall, chief, publications branch, information division, Agricultural Research Service, USDA, for the award winning informational program on the commemoration of 100 years of entomology in the United States.

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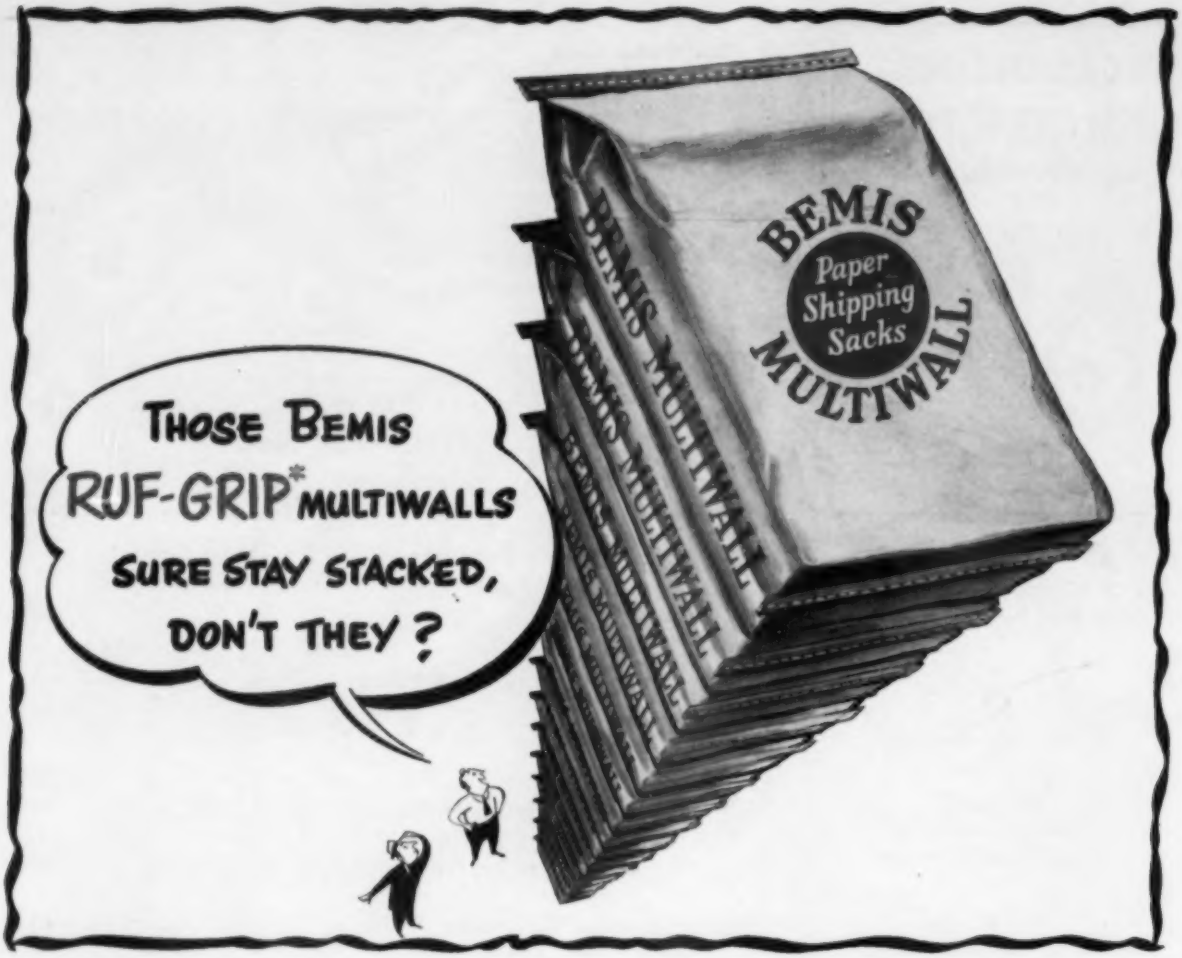

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Keep pace. Use the new way to control disease —**PHYTOMYCIN.**

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SAFENESS: Safe to plants. Does not injure trees, reduce set or impair fruit finish.

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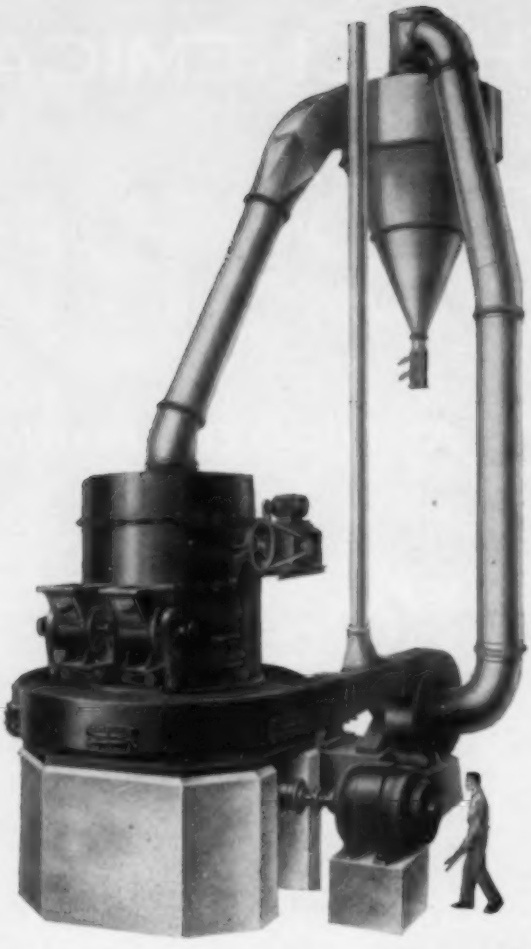

use a

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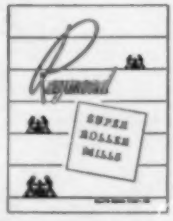
Raymond Roller Mills are equally efficient in pulverizing agricultural limestone, chemicals and insecticides and many non-metallic minerals.



Ask for Bulletin #72 on Super Roller Mills.
Ask for Bulletin #68 on Raymond Mills for insecticide grinding.

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We at International appreciate your keen interest in this improved Triple Super . . . and your orders for it. They make the years of research and investment in developing this new product even more gratifying. If you have not yet had opportunity to see this new International product, we invite you to write the Phosphate Chemicals Division for samples and quotations.

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EASY TO APPLY . . . EASY TO SELL

Phosphatic Fertilizer Solution

California Formulator Blends Monsanto's Solution with Aqua Ammonia to Make Neutral 8-24-0 for Direct Application

Mounted behind cutting blades for protection, slender hoses carry liquid 8-24-0 from tank into soil as fast as it is broken.

Side-dressing eight rows of carrots at a time is simple chore for this rig. Note twin tractor-mounted tanks for carrying 8-24-0 used by this fertilizing contractor. Formulator also sells direct to farmer, and does fertilizing on contract.

Fertilizer tank follows wide-spread drill rig. Set-up is particularly well suited to preplanting fertilization which may take place in either spring or fall in Sacramento-Imperial Valley-San Joaquin area where much of the 8-24-0 is sold.

New-type liquid fertilizer drill and tank arrangement gets trial. Formulator maintains sizable test area for trying out new liquid fertilizer applicators, and to observe results of various liquid fertilizer formulations on crop response.

Giant drill rig covers a lot of ground fast, gets through matted surface of field to inject 8-24-0 into root zone. Side mounting of these fertilizer tanks makes it possible to carry a full day's supply without delays for refilling.

8-24-0 is used on all varieties of crops. Here's a set-up that's ideal for applying it in close row work. The large fertilizer tank is mounted out of the way in the rear. Fertilizer drills located in front help driver guide tractor.

Photographs courtesy Brea Chemicals, Inc.

Formulator's customers don't need potash, so company makes 8-24-0. If your trade calls for a complete soluble fertilizer, Monsanto has the right ingredients:

Diammonium Phosphate	(21.0-53.8-00.0)
Monoammonium Phosphate	(12.2-61.6-00.0)
Phosphatic Fertilizer Solution	(00.0-54.5-00.0)
Dipotassium Phosphate	(00.0-39.9-53.0)
Monopotassium Phosphate	(00.0-51.6-34.2)

These compounds are highly concentrated—cost you less to store and handle. They're pure—give you extremely close control of formulation. And—your supply is assured by Monsanto, world's largest producer of elemental phosphorus. Write now for booklet "Concentrated Water Soluble Fertilizers" to MONSANTO CHEMICAL CO., Inorganic Chemicals Division, 710 N. 12th Boulevard, St. Louis 1, Missouri.

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CHEMICAL PROGRESS WEEK-MAY 16-21

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PENITE 6X

DOUBLE USE
DOUBLE STRENGTH

FOR POTATO TOP KILLING

FOR AQUATIC & GENERAL WEED CONTROL

FOR TERMITE CONTROL

FOR TREE-STUMP KILLING AND DEBARKING

PENCO PENITE 6X® is a highly concentrated sodium arsenite solution with versatile uses for industry and agriculture. It's a *concentrated, double-strength* product containing equivalent 9.5 lb./gal. of arsenite trioxide. You buy the *active* material . . . not a diluted solution.

One gallon of PENITE 6X® in 100 gallons of water applied 100-150 gallons per acre gives excellent potato vine kill plus good control of attendant weeds and grasses. Write for Bulletin N-3.

Properly used, PENITE 6X® controls submerged vegetation in lakes and ponds without killing fish. General top-growth weeds quickly, easily killed with PENITE 6X®.

PENITE 6X® is an excellent control agent for termites . . . and it's odorless!

PENITE 6X® is useful in thinning stands of timber; easier debarking of girdled trees.

For complete technical information on versatile, economical, cencentrated PENITE 6X® write for: PENCO Information Bulletins A-121 and N-3. PENCO® Agriculture Chemicals.

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On the right track

for Nitrogen balance in 1-1-1 ratios

High-analysis 1-1-1 ratio fertilizers are in fast-growing demand by farmers. The increasing call for 8-8-8, 10-10-10 and 12-12-12 emphasizes the need for a practical means of building nitrate and ammonia nitrogen balance in these popular grades.

ARCADIAN® Nitrogen Solutions and Sulphate of Ammonia turn the trick. This economical combination is all you need to produce 1-1-1 and other ratio mixtures which cure quickly, with better granulation, less dust and better handling qualities. For details on this practical way to better fertilizers for your trade, consult a Nitrogen Division technical service representative. His services are available to customers at no cost.

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(NITRANA® and URANA®)

Sulphate of Ammonia

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Nitrate of Soda

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Nitrogen Fertilizer

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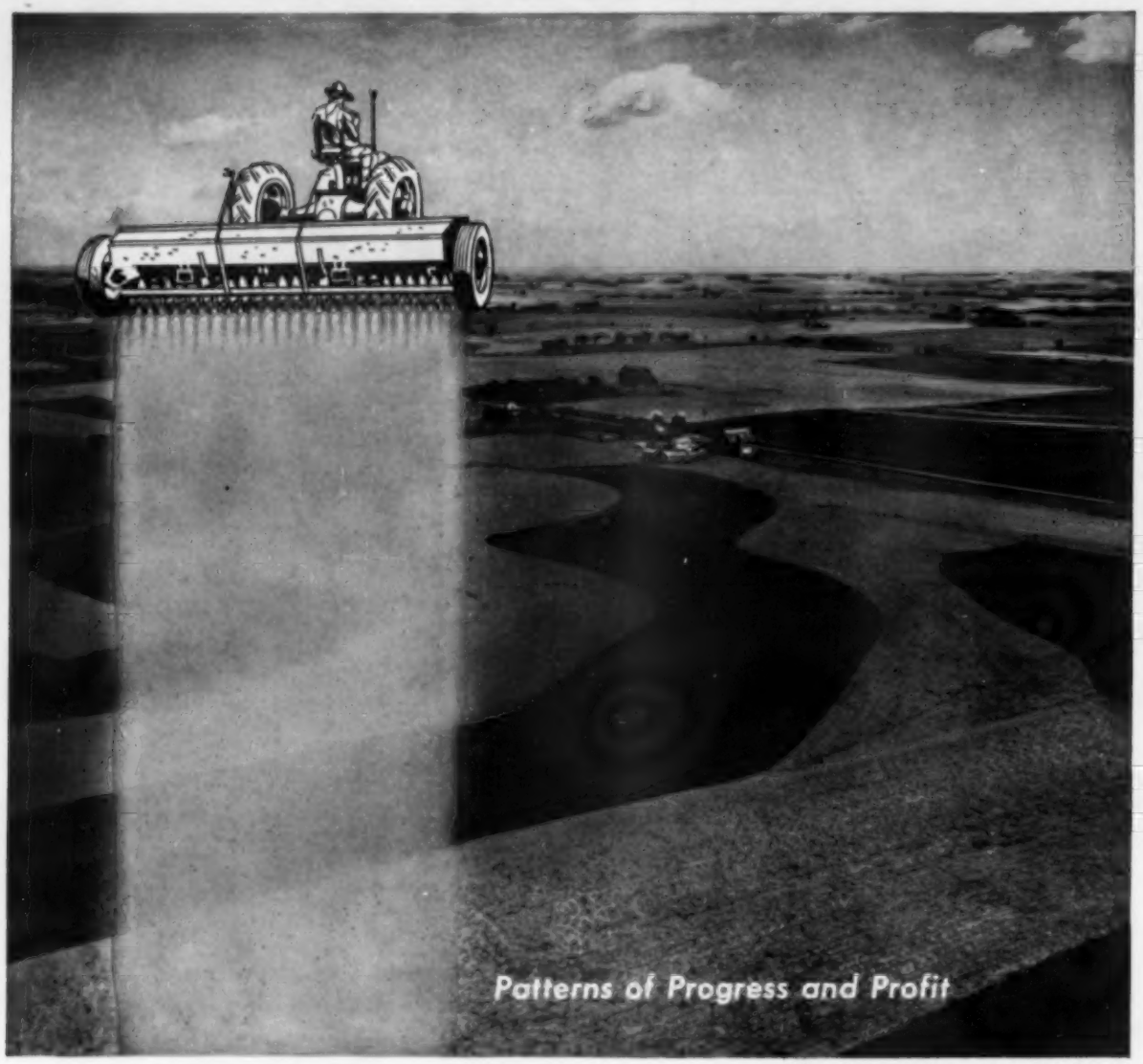

(Photo — Courtesy Soil Conservation Service, U. S. D. A.)

High Grade Muriate of Potash

by DUVAL

Duval Muriate of Potash ranks high as one of the essential nutrients which greatly increase yield and profits in crop production.

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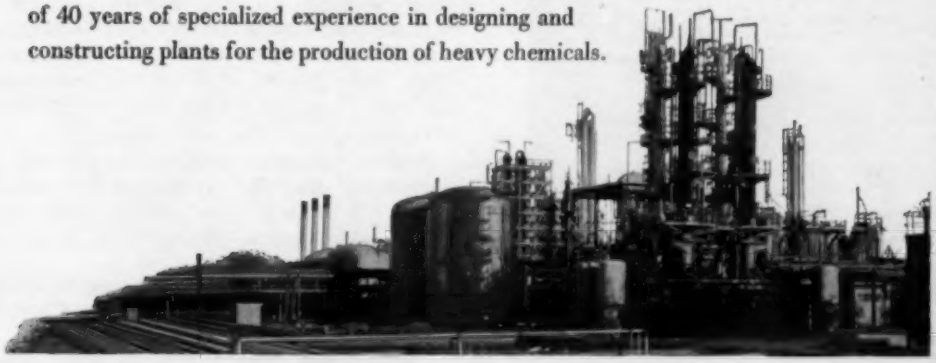
If you are planning to build a Chemical Process Plant—consult CHEMICO first • Chemico gives you the benefit of 40 years of specialized experience in designing and constructing plants for the production of heavy chemicals.



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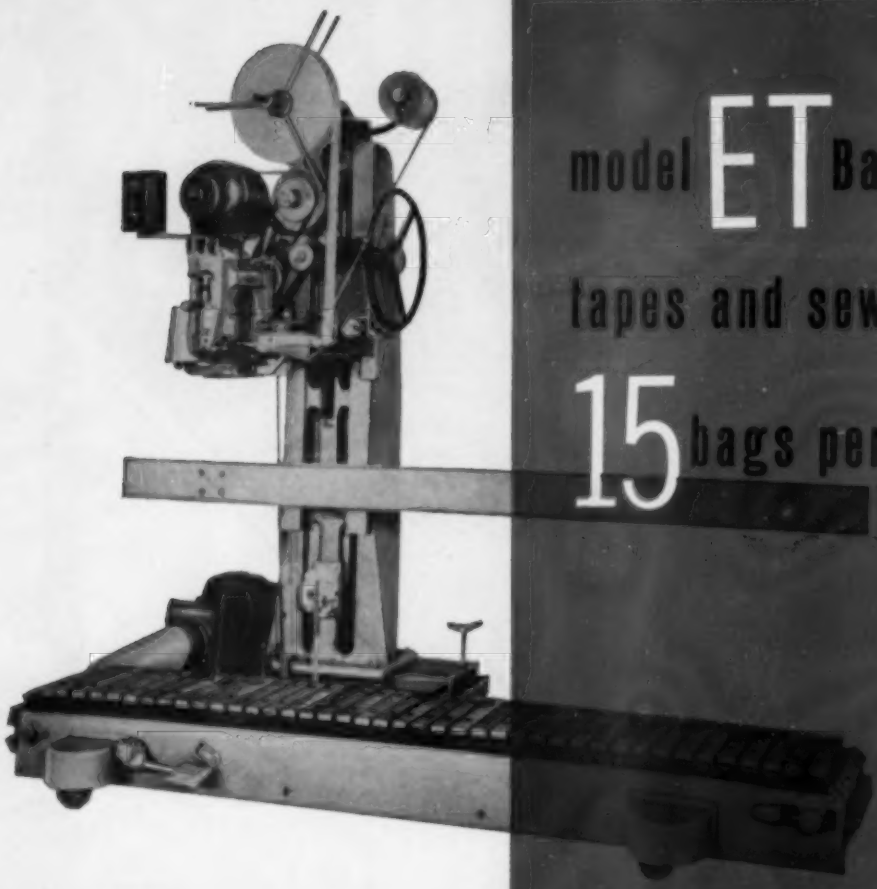

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tapes and sews 15 bags per minute

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- One operator finishes 15 bags a minute when filled bags are delivered continuously to the conveyor
- Adjusts to bags from 25 to 100 lb. capacity
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- Bag starts and stops sewing head when equipped with automatic sewing head control
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life to crops; death to insects

You can give new life and added vigor to your fruits or vegetables — and kill harmful insects at the same time — by adding GRACE UREA PRILLS to your regular pesticide sprays.

It's the simplest and quickest way to give your crops the supplemental nitrogen they need — over and above what is supplied to them in mixed fertilizers.

GRACE UREA PRILLS' fertilizing power — an unsurpassed 45% nitrogen — is full strength and quickly absorbed by foliage. You get top efficiency, because roots absorb any spray dropping to the ground. And GRACE UREA PRILLS are compatible with any commonly used spray material. This fertilizer is safe to handle, dissolves readily and does not corrode or clog spray equipment.

Suggested amounts for mixing with pest-control sprays are given in the chart at the right. Less concentrated solutions may be used, depending on the frequency of spraying and the specific nitrogen needs of your particular crop and soil.

Pounds GRACE UREA PRILLS suggested per 100 gals. Spray

VEGETABLES	LBS.
Tomatoes, cucumbers, cabbage, cauliflower, celery, lettuce, peppers, snap-beans, sweet corn, strawberries	4-5
Sweet potatoes	5-10
Potatoes	15
Carrots, parsley	20
FRUITS	
Apples	3-5
Cherries	5
Citrus	5-7½
Plums and prunes	10

USE GRACE UREA PRILLS FOR ALL TYPES OF CROPS • IN IRRIGATION WATER • AS A TOP-DRESSING OR SIDE-DRESSING • WHEREVER NITROGEN IS NEEDED

AVAILABLE IN 80 LB. MULTIWALL SACKS FROM YOUR LOCAL DISTRIBUTOR

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SINOX

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Sinox General • Sinox PE • Sinox W • Sinox

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WEED CONTROL:
Selective
Pre-emergence
Pre-harvest

SINOX—For safe, selective weed control in onions, flax and grain.
SINOX W—For selective spraying of seedling alfalfa, onions, flax and grain seeded to legumes.
SINOX PE—For pre-emergence spraying of beans, peas, corn, and potatoes.
SINOX GENERAL—As a desiccant for Seed Alfalfa, Clovers, Sudan Grass, Milo, Flax. Also used as a chemical weed mower in orchards, vineyards, ditches, etc. Potato Vine Killing.

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Stantox "P-44" — 2,4-D Ester

STANDARD AGRICULTURAL CHEMICALS
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Stantox "T-45" — 2,4,5-T Ester
Stantox Brush Killer — Low Volatile Esters of 2,4-D and 2,4,5-T
Stantox "LV-45" — Low Volatile 2,4,5-T Ester
Stantox "Sodium TCA" — (90%)
Stantox MCP - Stantox IPC
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Elgetol "30"
Elgetol "318"

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Lion Aqua Ammonia—For formulation or acid oxidation. Ammonia content about 30%. Other grades to suit you.

Lion Ammonium Nitrate Fertilizer —For formulation or direct application. Improved spherical pellets. Guaranteed 33.5% nitrogen.

Lion Nitrogen Fertilizer Solutions —For formulation. Three types to suit varying weather and manufacturing conditions.

Lion Sulphate of Ammonia — For formulation or direct application. Uniform, free-flowing crystals. Guaranteed to contain a minimum of 21% nitrogen.

Because of Lion's leadership in nitrogen fertilizer production in the South, Lion can show you the way to MORE PROFITS.

When you buy your complete nitrogen requirements from Lion, you automatically put yourself in a position to improve your profit picture. Here's how:

1 **You Save Time** • You can contract at one time, with a single dependable source, for all of your nitrogen fertilizer material requirements. And, of course, time saved today is reflected in your profits tomorrow.

2 **You Prevent Manufacturing Delays** • Formulation material that does not have consistent quality can slow down or delay your own production needlessly. With Lion's Quality Control, you can be sure of *quality* materials. The difference will show up in your profit column.

3 **You Solve Problems Quicker** • If you run into a formulation snag, Lion's highly trained Technical Staff will be ready to give you the kind of technical assistance that can only come from a leader. This aid can help improve your profit picture . . . and *it's yours for the asking.*

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in the bag

It adds to your fertilizer's effectiveness!

on the bag

Mg tells the farmer your brand contains soluble magnesium!

added sales with Sul-Po-Mag®

Water-Soluble Double Sulfate of Potash-Magnesia
$(K_2SO_4 \cdot 2MgSO_4)$ 22% K_2O—18% MgO

Sul-Po-Mag is produced exclusively by the *Potash Division* for use in quality mixed fertilizers and is also bagged for direct application. It makes fertilizers more effective by supplying water-soluble *sulfate of magnesium* in balanced combination with *sulfate of potash*, a premium form of potash. As an ingredient in mixed fertilizers, *Sul-Po-Mag* is the most satisfactory way for farmers to supply soluble magnesium . . . called, in many areas, *the fourth element in the fertilizer bag*. At Carlsbad, New Mexico, the *Potash Division* mines and refines these quality products for fertilizer manufacturers—Muriate of Potash, Sulfate of Potash and *Sul-Po-Mag*.

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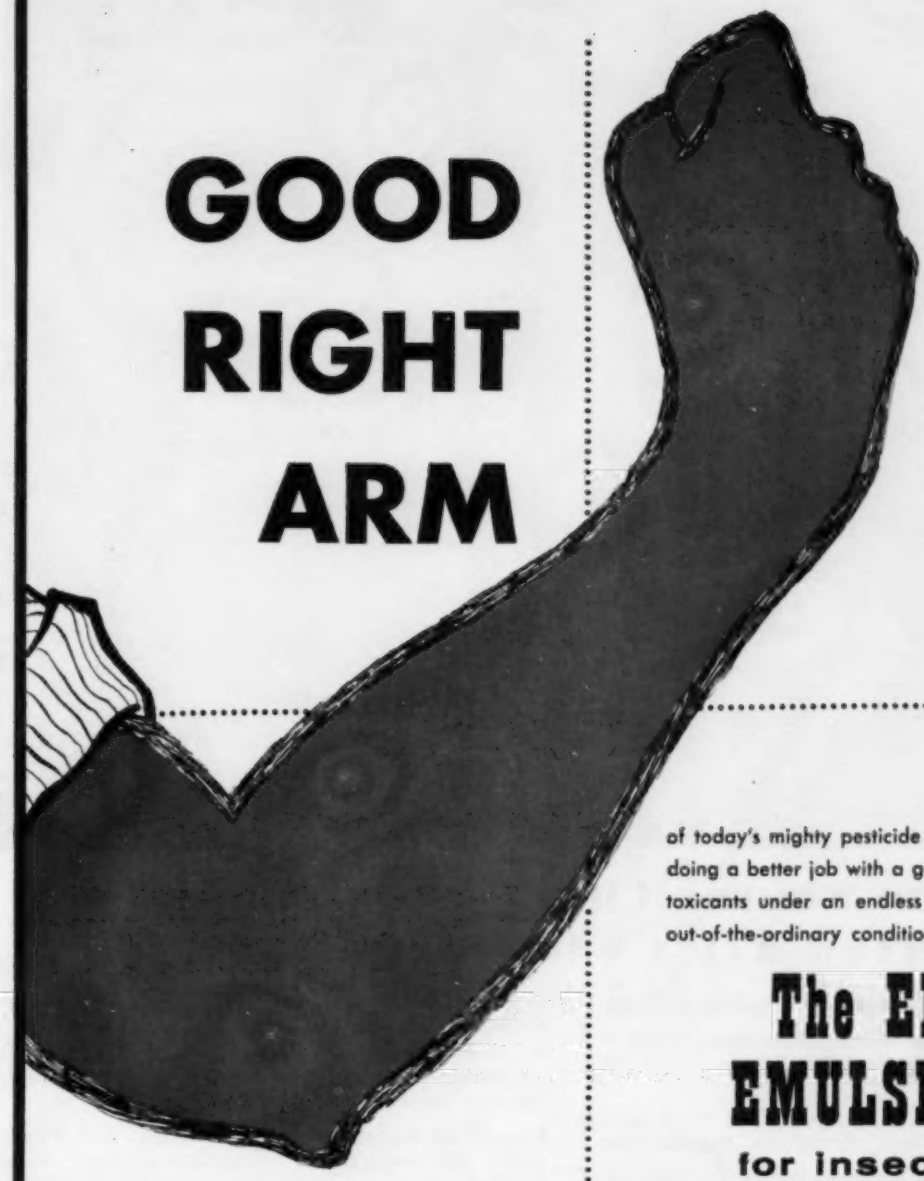

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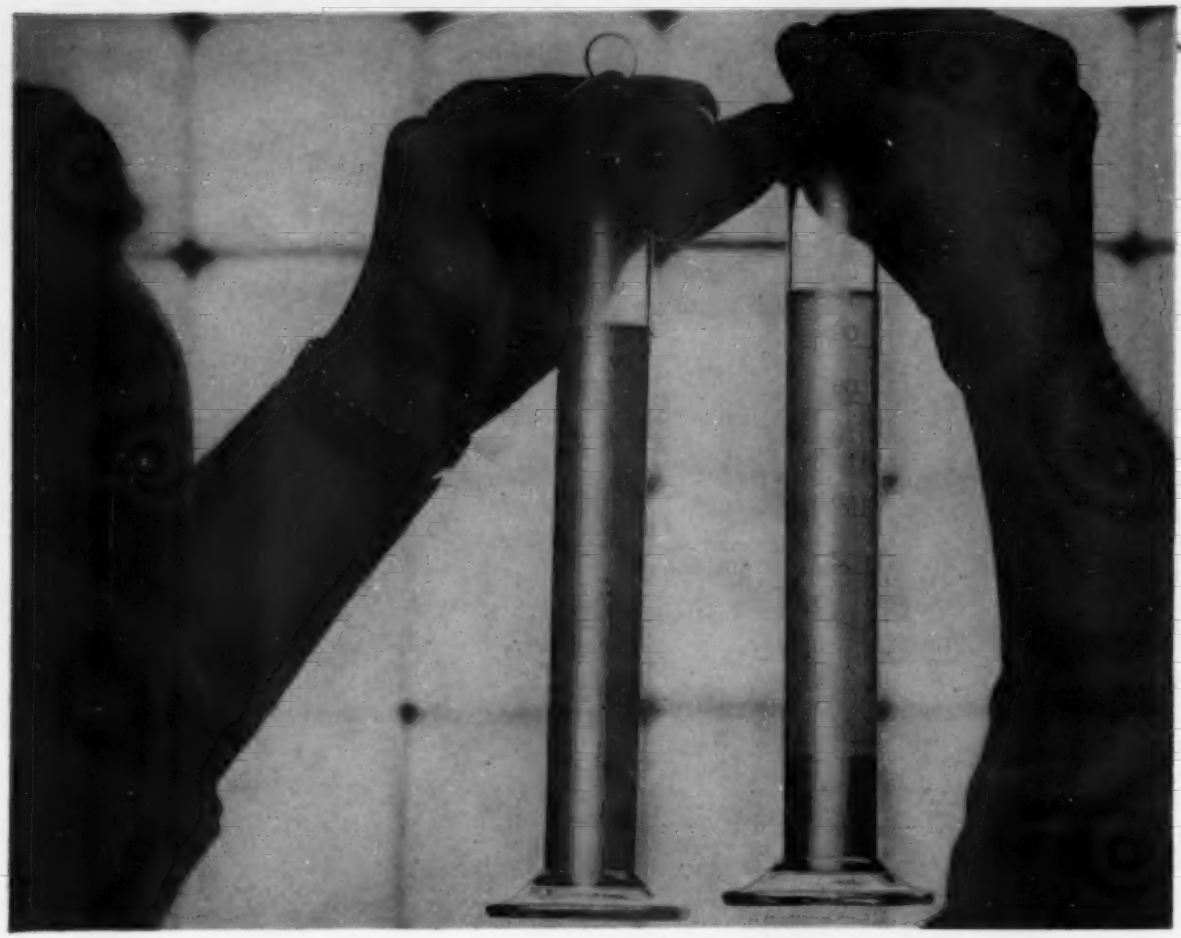

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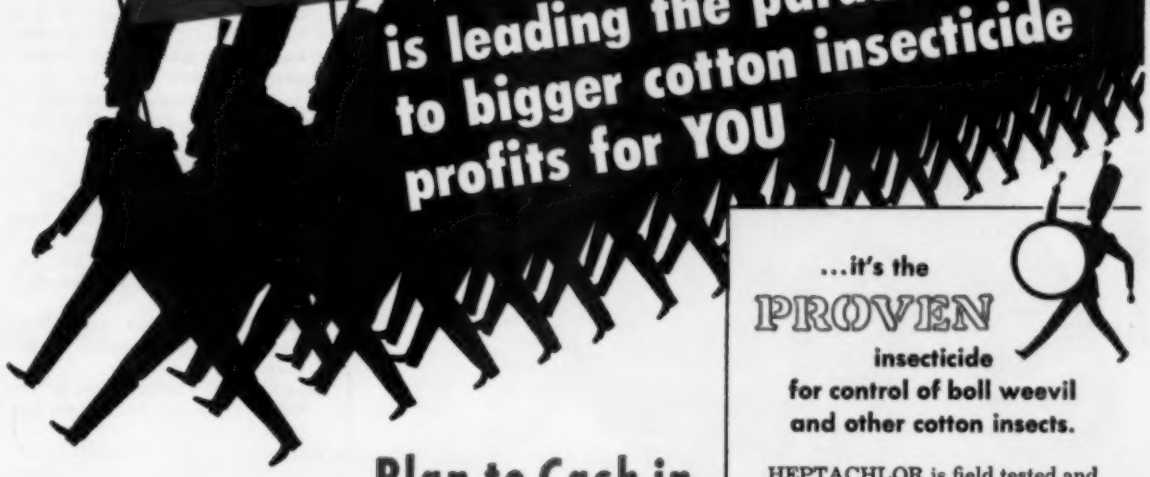

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REPRESENTATIVES IN PRINCIPAL CITIES

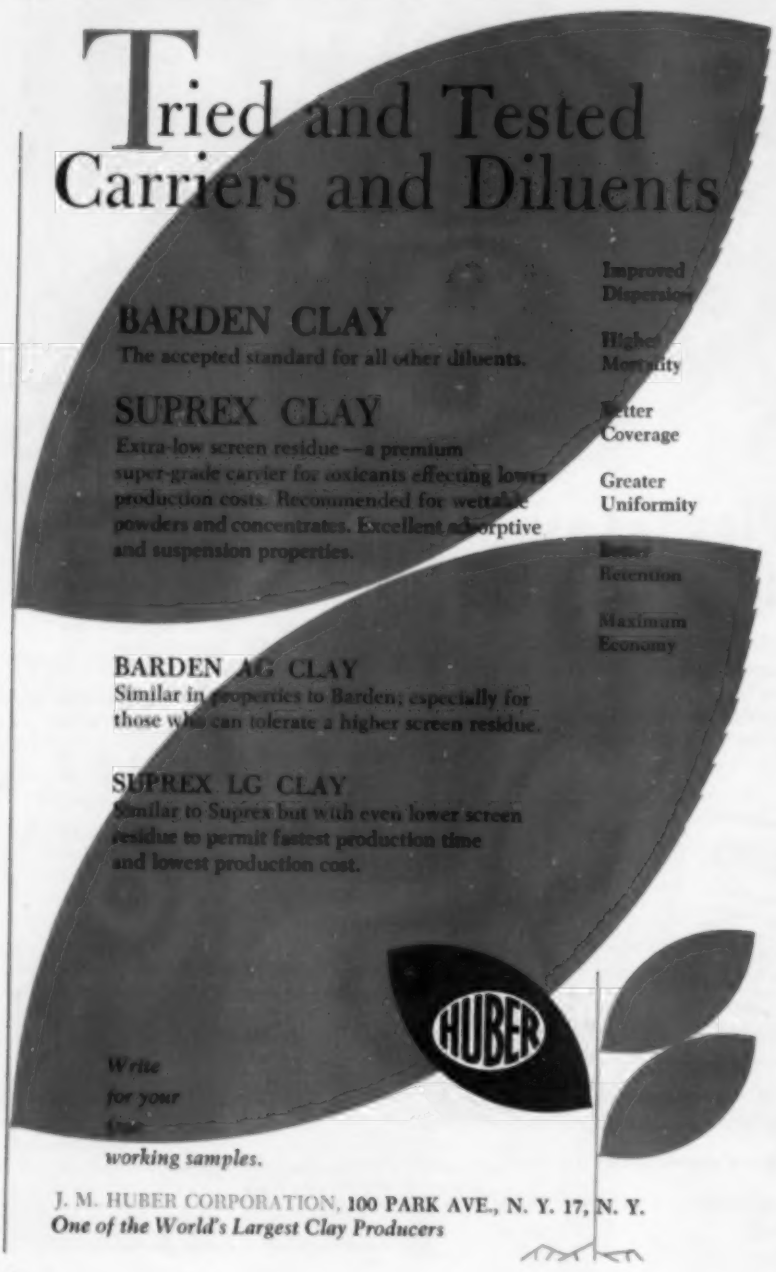
Letter to the Editor

Dear Editor:

Congratulations on your editorial on selling and servicing the insecticide user. As a distributor of insecticides and application equipment we feel we are better acquainted with our local market and, because of our technical staff of entomologists, can better service our area through dealer sales. At this writing we are faced with the problem of a large fertilizer manufacturer, who is now in the insecticide business, using the old fertilizer trade tactics of selling dealers at distributor prices, with the resultant break-down of price structures. Unfortunitely, a large insecticide manufacturer from a neighboring state evidently was having distribution problems too, for they came in and offered a dealer a consignment deal at distributor prices. (My definition of distribution and dealer is based on the service each performs. A distributor stocks materitals and sells only to dealers—a dealer has a place of business and sells to consumers, such as farmers, growers, etc. It is not based on the amount the individual purchases—a large farmer is a consumer, not a dealer, regardless of the quantity he buys.)

How far can this break-down of the steps in distribution go before the whole system will fall apart? When will the big manufacturer realize that if it comes to a rough and tumble fight, the distributor can beat him at his own game? If an orderly system of marketing cannot be maintained, a great disservice will be done to American agriculture.

Eugene J. Gerberg,
CORNELL CHEMICAL & EQUIPMENT CO.
Baltimore, Md.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Meeting Calendar

May 3-4 — Carolinas-Virginia Pesticide Formulators Association, Pinehurst, N. C.

May 15-17—Chemical Specialties Manufacturers' Assn., Statler Hotel, New York

May 19 — Fertilizer Section, 25th Annual North Carolina Safety Conference, Winston Salem, N. C.

June 2 — S. C. Fertilizer Meeting, Sand Hill Experiment Station, near Columbia, S. C.

June 3 — Fertilizer Section, Virginia State Safety Association, Richmond, Va.

June 11 — Executive Committee, Fertilizer Section, National Safety Council, Roanoke Va.,

June 12-15 — National Plant Food Institute Convention (joint meeting of APFC and NFA), The Greenbrier, White Sulphur Springs, West Va.

June 21 — Western Agricultural Chemicals Assn., Hotel Clark, Los Angeles.

June 22-24 — Pacific Slope Branch, E.S.A., Mission Inn, Riverside, Calif.

June 22-24 — 13th Annual Convention of the Association of Southern Seed and Fertilizer Control Officials, Jung Hotel, New Orleans.

June 28-30 — Regional Fertilizer Conference, Pacific Northwest Plant Food Association, Boise Hotel, Boise, Idaho.

Aug. 9-10 — Ohio Pesticide Institute Summer Meeting, Wooster, Ohio.

August 10 — Kentucky Fertilizer Conference, Guignol Theatre, University of Kentucky, Lexington

Aug. 15-19 — Annual Meetings, American Society of Agronomy and the Soil Science Society of of America, California College of Agriculture, Davis, Calif.

Sept. 7-9—National Agricultural Chemicals Assoc., Annual meeting, Spring Lake, N. J.

Sept. 7-9 — Beltwide Cotton Mechanization Conf., Texas A&M College

Oct. 18-20 — Canadian Entomological Society of America, Fredericton, B. C.

Nov. 7-8—California Fertilizer Assoc., 32nd annual meeting, Hotel Mark Hopkins, San Francisco.

Nov. 28-Dec. 1 — Entomological Society of America, Annual Meeting, Netherlands Plaza, Cincinnati.

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Editorial
COMMENTS

WITH time marching relentlessly on, and July 22nd, the date when the Miller Bill will become effective, now being less than ninety days off, we begin to get the feeling that there is still much left to be done in many quarters, and that when the starter's gun sounds there will be some who will be left at the post.

Industry has had nine months of its year of grace to get its work done, but some have postponed putting their houses in order, perhaps with the feeling that a further extension might be anticipated. From all evidence to date, however, any expectation of a further extension is unjustified, and manufacturers, formulators and resellers of pesticides, as well as research and extension workers must count as their only safe bet on the Miller Bill going into effect on schedule, and must prepare themselves accordingly.

For any products where tolerances have not been set up, or exemptions from tolerances granted, or where label registrations have not been accepted, it will simply mean that the product will have to be withdrawn from the market. There have been ample warnings, and no one needs to have been caught napping. Undoubtedly, however, we will find after July 22nd that some have been asleep at the gate.

A repetition of previous words of warning might well be addressed to growers and custom applicators. After July 22nd only those pesticides should be used which can be applied in such a way as to meet the requirements of the new law. Spray schedules will have to be worked out so that tolerances set for permitted materials on finished crops can be met. Growers who take chances with unapproved pesticides, with heavier than permitted dosages, final sprays too close to date of harvest, etc. will be running the serious risk of having their entire crop picked up and condemned. And it is certainly the responsibility of manufacturers and dealers who supply them with their pesticides to keep them informed, and warned as to the dangers of trying to cut corners on the new law.

ONE of the best investments a farmer can make is to leave at least a small margin of profit for the supplier in the products he buys. We trace this sound bit of advice to a top executive in one of the most successfully operated co-ops in the country.

This is probably true right across the board, but it is certainly more than true when applied to pesticide purchases. To use insecticides intelligently, and to get the maximum benefit from them in increasing crop yields, the farmer needs sound advice from insecticide experts on what to use, when to apply it, how to apply it. Without an adequate return, it is obvious his suppliers can't support the trained entomologists and trouble shooters whose team work is essential to making the products work.

A little profit left in the pesticide purchase price will pay dividends to the farmer in the long run.

And while we are on the subject of leaving something in the deal with which to meet essential expenses, the industry's basic suppliers would do well too to restore some protection for the distributor in working out their pricing policies. Obviously, again, he can't be expected to perform the essential functions of a distributor, when dealers are buying on essentially the same basis as he is.

Influence of granule size and on the action of

IN the mid-twenties, granular fertilizers, and then only nitrogenous fertilizers, appeared in Germany for the first time. At the beginning, the only purpose of granulation was to reduce the hygroscopicity of nitrate of lime and ammoniated nitrate of lime. The success of these two fertilizers encouraged the granulation of Chilean nitrate of soda and calcium cyanamide. At that time also the new fertilizer "Nitrophoska" was delivered in a granular form.

The ready acceptance of granular fertilizers is attributed to the following features: (1) they do not give rise to dust problems or losses; (2) granular fertilizers are easier to handle and can be distributed more evenly and with greater facility; (3) the distance at which a granular fertilizer can be broadcast is greater and this means a saving in labor; (4) the granules do not adhere to the leaves of plants but roll off, thereby avoiding scorching in the case of top-dressings; and (5) granulated fertilizers have a more pleasing appearance than fertilizers in powder form.

The above are listed as the primary advantages of granular fertilizers over the conventional product. It is pointed out that there is no improvement in action on plant growth or response in use of granulated fertilizer as compared with the powdered form.

In 1952, the superphosphate industry in Germany decided to place granular material on the market at a time when Sweden had already completed a considerable amount of experimental work and had for the most part changed their production to granular material. Although in Sweden, England and America granulation is carried out according to the so-called classical process, where the ground superphosphate is changed into granules in a rotary kiln by the addition of water and subsequent drying, various other methods have been adopted in Germany in an attempt to eliminate the drying process.

Granulation by means of an obliquely rotating disc and the "Eirich" mixer has been adopted widely in Germany. Although production of granular superphosphate is possible without drying and results in a satisfactory material, major difficulties have been encountered when producing granular mixed fertilizers; and this has induced several manufacturers to interpolate a drying process.

Much work has been done on the effect of granulation but only a few useful experimental results are available. Granulation has hardly any influence on the action of nitrogen or potash fertilizers because the salts are readily soluble and diffuse rapidly in the soil. The situation is different however in the case of phosphates.

The water-soluble phosphoric acid of superphosphate dissolves rapidly out of the granule only to be pre-

*A report by Prof. A. Fruhstorfer Verein Deutscher Dunger-Fabrikanten, Hamburg-Sasel, Germany. Presented at the meeting of the International Superphosphate Manufacturers' Association, September, 1954, Bordeaux, Switzerland.

product form phosphates

cipitated in the vicinity of the granule. At first it might be assumed that this accumulation in pockets is detrimental to its action. Experimental results, however, have proved that this is not the case. Assimilability is maintained and increased through the formation of well fertilized pockets.

O. Franck, Utuna, explains this phenomenon as follows: Superphosphate has a more beneficial action when granular. The product in powder form reacts more rapidly and more strongly with the soil than granular material, but in doing so the former loses more rapidly the capacity of supplying plants with phosphoric acid. The large particles are capable of saturating zones around them with P_2O_5 thereby rapidly supplying the plant roots with phosphoric acid.

The case of granular superphosphate is comparable to that of fertilization in layers and bands: The surface in contact with the soil is diminished, and hence the reaction causing reversion of water-soluble phosphoric acid is retarded. O. Franck reported on the experimental results given in table below.

Even prior to the war, pot experiments with granular superphosphate and other phosphatic fertilizers were conducted in the former Agricultural Experimental Station of the German association of fertilizer manufacturers at Hamburg-Horn. The results however have been published only since World War II. On an acid sand soil, granular, as compared with the powdered form of superphosphate, resulted in increases in yield up to 9%, while basic slag gave considerably inferior yields.

These experiments induced Schmallfuss in Halle to conduct similar pot experiments with granular superphosphate. He was unable to confirm the results of the Experimental Station at Hamburg-Horn on a loess soil rich in lime but very deficient in phosphoric acid. Michael, Jena, was equally unable to ascertain any advantage of granulation on soils rich in lime, while on acid soils only slight differences in favor of the granulated material were established.

Although the pot experiments show that phosphoric acid increases crop yields, the results have not been confirmed in field tests. However agricultural practices in Sweden, as indicated before, show a preference for granular fertilizers. Also from Russia, numerous experimental results are available, which show that the application of granular superphosphate, especially when worked in rows, results in an appreciable increase in yield.

In Germany, the granular form of superphosphate was examined by a commission instituted by the government before being offered commercially. The granular fertilizer was found as satisfactory as the finely powdered superphosphate and in some cases better; if they had been inferior, granular fertilizers would not have been approved by the authorities.

Our own experience in the course of the last two years with pot experiments in the Agricultural Experimental Station Annen-Hof can be summarized as follows:

If sown broadcast, the granular product is superior to the powdered, especially on limed soils. In top-dressing, it is slightly inferior.

With dressing applied in layers and bands, the effects of both methods varies, but on the whole it is the same; fertilization in layers or bands which are effective in every case, can be obtained only with granular products.

There are, of course, deviations and exceptions from these rules which sometimes could be attributed to the inadequacy of the experimental technique. The data in the tables on page 32 represent a report on pot experiments in regard to crimson clover and maize.

Relative yield is listed in the tables on Page 32 for crimson clover and maize with doses of P_2O_5 amounting to 0.45 g and 0.90 g per Mitscherlich pot (Yield with finely powdered superphosphate distributed in the arable soil; dose of 0.45 g = 100).

How do matters stand with other phosphatic fertilizers which do not contain any water-soluble phosphoric acid? All the attempts in Germany to produce granular Rhenania phosphate or granular basic slag have, up to the present, failed. Pot experiments in agricultural chemical institutes revealed that the effect of these phosphates decreases as soon as they are applied to the soil in granular form. As mentioned before, these phosphates require to be dissolved by a reaction in the soil, during which they must encounter H-ions. Only with an even distribution in the soil is the reaction at its optimum. Since this reaction is slow, it prevents fertilizers from being converted into forms of phosphates which are soluble in the soil, and which plants do not assimilate readily.

In the case of superphosphate, however, where the phosphoric acid is very prone to reaction, this conversion takes place very rapidly and can only be slowed down if not intimately mixed with the soil, as is the case with a granular product. Consequently, it is possible to advise that all fertilizer phosphates containing phosphoric acid in a non-watersoluble form cannot undergo granulation without decreasing their action. In

Superphosphate in lbs/acre	average of 5 year-harvest in lbs/acre	relative yield
Without superphosphate total yield	2052	100
Increase in yield with 88 lbs P_2O_5		
in the form of powdered super broadcast	+130	106.3
In the form of granular super broadcast	+194	109.5
In the form of granular super placed	+301	114.7

Method of application	Crimson clover			
	0.45 g P_2O_5		0.90 g P_2O_5	
	powder	granular	powder	granular
without phosphoric acid	69			
arable soil	100	107	109	116
Top-dressing	100	99	100	101
Layer 6 cm	110	110	106	114
Layer 12 cm	115	110	116	110

Methods of application	Maize			
	0.45 g P_2O_5		0.90 g P_2O_5	
	powder	granular	powder	granular
Without phosphoric acid	69			
arable soil	100	104	136	132
top-dressing	100	97	144	159
layer 6 cm	116	103	143	151
layer 12 cm	104	87	127	122

the only experiment at our disposal, the decrease in yield of basic slag (size of granule 3-4 mm) amounted to 46%.

The effect of compound fertilizers after granulation requires further study. In 1952, Poll published some very interesting figures on the effect of a granular nitrophosphate as compared with granular superphosphate. Since the phosphoric acid of the nitrophosphate fertilizer is not water-soluble, considerable decreases in yield were observed as compared with superphosphate. Stewart, however, could not confirm these findings in 1953. We ourselves have not yet carried out such investigations at Annen-Hof. On considering this matter, it appears clear that compound fertilizers containing phosphoric acid which is not water soluble must remain in a powdered state if an optimum response is desired.

It is to be assumed that the manufacturers of compound fertilizers have a greater knowledge of this subject than ourselves. We in Germany have quite a number of granular compound fertilizers produced by dissolving rock phosphate with nitric acid and phosphorc acid. They are known under the trade names of "nitrophoska, Kampa, Ruhrvolldünger and Volldünger Hoechst." At first, they contained hardly any water-soluble phosphoric acid, as ammoniation had been carried out to the limit. It has now become known that some works have changed their method of production in order to obtain a granule with a high content of water-soluble phosphoric acid.

For the same reason the superphosphate industry in Germany has proceded with their production of compound fertilizers in such a manner that at least 50% of the phosphoric acid remains water-soluble during ammoniation. In our products, the proportion of water-soluble phosphoric acid is 50-75%. Hence they reveal an excellent action also after graulation, indeed, it may be assumed that with this proportion of water-soluble phosphoric acid, granulation offers a superior action.

As observed by O. Franck, the young absorbing roots of the plants collect in the vicinity of the granules, which they cover with a thick layer. In so doing, they not only absorb the water-soluble phosphoric acid, but also the citrate and citric soluble phosphoric acid in a more complete manner than would have been possible with an even distribution.

The influence of the size of the granules on growth remains to be investigated. Theoretically, the following consideration appears to be justified: the larger the fertilizer granule the less is the contact of superphosphate with the soil and hence the assimilability of the phosphoric acid is superior. On the other hand, with increasing sizes of the granules, the fertilizer pockets are invariably farther apart, thereby reducing the plant's chance of finding a fertilizer pocket. This year, we have carried out a large number of experiments with Mitscherlich pots in order to examine this question. The experiment with linseed, spring barley and oats has not yet been evaluated. In order to create difficult conditions for the effect of superphosphate, a strongly acid soil was chosen, and in a second trial, the same soil was used after liming.

It is possible to see the effect of the size of the granules on plant growth from the curve representing the unlimed plot. Experiments showed that the optimum effect of the granule size lies in between a diameter of 3 and 5 mm; but when compared with the smaller sizes down to 1 mm, the advantage of this size of granule is not considerable. On the other hand, finely ground superphosphate shows a considerable decrease in yield on this soil. Hence the conclusion that the size of these granules should be 1-5 mm appears to be confirmed.

As a result of these observations and considerations, a rapid change over to granular material is taking place in Germany in the case of superphosphate and mixed fertilizers; and it may be assumed that this process will be complete in the course of the present year. The Agricultural Experimental Station Annenhof has introduced a supervisory service for all products of the superphosphate industry, submitting the quality of the granulated material to a constant control. The size, hardness and moisture content of the granules are being tested.

Granules with a diameter of 1-5 mm are passed, a variation of 5% is admissible in the case of undersized or over-sized granules. By endeavouring to attain a standardized quality by means of this control, in spite of the varying methods of production, the industry aims at increasing the confidence of the consumer in the product. Granulation coupled with band placement opens up new prospects for the sale of water-soluble phosphoric acid.★★

You can read about the home town in the local newspapers . . . but if you want to keep up on what's going on in the agricultural chemicals industry . . . and keep up on new developments in the trade you'd better keep your copies of "Agricultural Chemicals" coming.

A Workable Small Plant SAFETY PROGRAM*

THE tragedy of accidents is completely independent of the size of plant operation involved . . . thus the importance of a safety program in ALL plants cannot be emphasized too strongly. It is sometimes argued by the small plant operator that "a safety program is easy for the big operators who can afford a full-time safety engineer, but it is more difficult for me to do it, and still run my business." It is, no doubt, a great help to be able to afford the services of a full-time safety engineer. The contributions of these men to the advancement of accident prevention cannot be denied, but are their results not due to the fact that they have the true conception of what safety means?

What is safety? First of all, it is an idea, a thought, a state of mind, that *every* movement or action *can* be performed in a safe manner. Second, it is an intention to force the body to perform the actions in the safe manner which the idea has already generated in the mind. This is safety, reduced to its most elemental components. It takes only a modest amount of time to train our minds to function in this manner, and we soon find that we have become, what is generally defined as, safety conscious. Having arrived at this happy state, it is not difficult to transmit these ideas and intentions to those working with us and for us. If we are operators of a business, be it large or small, I do not think we would be too conceited to assume that ultimately every job or task performed in our plant is the fruition of an idea or intention that we have had. If it was our idea to enter the fertilizer business, to manufacture and sell a ton of fertilizer, can it not also be our idea to carry out these operations in a safe manner?

Since we are discussing a safety program for the smaller plant and acknowledging the fact that we cannot afford the services of a safety director, it is then normal to assume that the owner or operator personally supervises many of the operations. He, then, is the top man in our small plant safety program. Being primarily a businessman, when it is recommended to him to instigate a safety program in his plant, his first questions are; "What does it cost and what are the returns?"

What are the costs of a small plant safety program?

1. Time:

   The amount of time will, of course, vary with the individual and also how sincere he is about making the program go. If a person desires to be safety conscious, (and he must be to sell the program down the line) it requires no more time to think of a safe way to perform a task than a careless way. The same mental processes are involved. It takes but a few seconds more to instruct a foreman or worker to perform a task safely than to just issue the order for work to be done. Everytime you walk through the plant, observe how the men are working as regards safe practices. Look especially for slipshod methods and careless attitudes. Take a few extra seconds to inspect machinery for danger points that might be provided with guards. Insist on good lighting and good housekeeping. A few extra minutes a day will do the job, and also impress upon the workers that you, personally, are sold on safety.

2. Money:

   The returns for the reduction of accidents are so great that it is almost absurd to think about the costs. A few dollars for machinery guards, replacing some worn steps or dangerous ladders, a few extra lights and a couple of good brooms will do wonders for your plant. We would also like to suggest the expenditure of $25.00 per year for a membership in the fertilizer section of the National Safety Council. A $25.00 membership covers up to 99 employees, and an opportunity to attend the annual safety congress held every October in Chicago. You will find our annual meetings to be instructive, inspirational and well worth the time and money spent for attending.

3. Returns:

   It is most aggravating to encounter a lot of stress placed on, "what do I get out of a safety program?" What do you get out of helping a blind man across a street, helping an elderly person on a bus, visiting a sick friend? What has happened to the golden rule? Are we hiding behind Cain's infamous statement, "Am I my brother's keeper?" It didn't help Cain. It seems to me that the satisfaction derived from having a business in which people can find safe, healthful and happy employment would alone be enough repayment for the small cost of maintaining such conditions in the plant. Of course, there are returns, returns in increased production due to greater efficiency of the workers; returns in decreased maintenance costs due to more care being exercised in use of equipment; returns in re-

*Based on a paper presented by H. R. Krueger, Snyder Chemical Co., Topeka, Kansas, at the fertilizer meetings of the recent Southern Safety Conference in New Orleans.

duced premiums of compensation insurance due to rates being based on lowered accident frequency; returns in less shrinkage of saleable materials due to better housekeeping and returns in overall morale of the worker due to better working conditions.

Are these not enough incentive for you to want a safety program in your plant? You, top management, are the one who must first want the program, because you are the one who must head it up. What are the tools required to build the program? Just three are necessary, time, a little money and men. We have discussed the time required of you and also the money, so the third and most necessary are the men.

Regardless of how small your plant may be you certainly have some kind of superintendent, foreman or leader to carry out the day by day operations. This man is your usual contact with the crew and in order for him to help you make a safety program go, he must be sure of two things; first, that you actually believe in the program yourself, and second, that it is part of his job to see it carried to the men. So this man is your first job. Convince him that in order for the plant to perform any operation efficiently, it must be performed safely. Impress upon him that the elimination of accidents is the greatest cost-cutting factor he can employ. Be sure that he realizes that the workers, whose efforts he directs, are human beings—free Americans who should have the privilege of earning their livelihood in the best of working conditions. The foreman is the keystone in the arch of safety.

How do we reach the worker? Performing any task in the safe and proper manner is a matter of education. There are two methods of education, visual and oral. We learn by seeing and hearing, and no doubt, seeing is the most effective. The foreman should know the correct and safe way to perform all the physical jobs the men are called upon to do. He should make it a point personally to instruct each man in his job. The foreman should know every danger point in the plant and see to it that workers know how to perform safely at danger points. There are danger points in the way a bag is lifted, as well as in using dynamite or operating a payloader. New employees need special attention. Not only are they strange to the operations, but there is a good possibility that they have never performed this type of job before. Careful instructions and *examples* to the new employee will prevent many injuries later.

Regular safety meetings for the entire plant crew are of great value. Management should never fail to be present at these meetings. Our own company experience indicates that luncheon meetings are the most effective. We furnish the entire crew with sandwiches, coffee or soft drinks and dessert. After eating, we have a short program. Every other program is a "case history" affair during which any employee who was involved in an accident, or near accident, is required to tell what happened, what caused it and how he thinks it could have been avoided. If any other employee was known to have witnessed the occurrence, his version is also called for. If no specific incidents have occurred to discuss, then a question and answer period is used, regarding possible hazards in the plant. The first or second meeting of this type seems to fall rather flat, as it is difficult to get the men to talk, but soon you will find you almost have to limit the discussion to keep from running over time.

We use our insurance carriers as a source of material for other of these safety luncheons, either to furnish a speaker, a film or both. We find our insurance people to be most co-operative in furnishing men and material for this purpose.

A "No Lost Time Accident" sign, with changeable numerals for the days involved and other visual aid posters and warning signs have a definite place in a safety program. A word of caution, however, on these. Keep them clean, up-to-date and posted in places where they can be seen.

Proper maintenance of the plant and machinery is a great contribution to the reduction of accidents. Payloaders with faulty brakes and worn steering have caused many an accident or at least, damaged equipment. Acid and ammonia have caused many injuries, largely due to leaking lines, valves, pumps and fittings. The use of goggles or face shields should be a requirement on any worker handling these liquids, especially when connecting or disconnecting tank cars, or making repairs to the handling system. Inadequate car plates and hard rolling hand trucks have caused many a back strain and injured arms and legs, to say nothing of what they do to the efficiency of the men. Good maintenance and safety go hand in hand, paying high dividends in longevity of men and machines. The abuse of equipment by workers should not be tolerated. Show me a man who abuses equipment and I will show you a man who is sooner or later going to be involved in an accident, if not to himself, then to a fellow worker.

It is elementary that it is the worker who must be reached to make the safety program go. He must realize that it is *his* program, that you and your foreman expect him to participate 100% by performing every task safely, and that the well-being of his fellow worker is his responsibility, as well as yours.

The costs of a safety program are time and money, with the amount of neither being necessarily prohibitive. We should add a third cost—men. Assuming the man is already an employee, doing gainful work and doing it safely, he is not a "cost", he is a "profit". Why not keep him so?

The actual mechanics for setting up a workable safety program for the small plant are few and should consist of the following:

1. A safety conscious top management
2. Direct placement of responsibility
3. A planned safety organization, including:
   (a) Safety Committee
   (b) Investigation of Accidents

(Turn to Page 115)

Spray Programs . . .

A Reader Asks How Much Harm To Birds Is Inevitable . . . and What Can Be Done To Minimize Bird Loss

March, 1955
Shade Tree Commission
Lower Merion Township
Montgomery County, Pa.

AGRICULTURAL CHEMICALS
Caldwell, N. J.

Dear Editor:

This section of the country is experiencing a very severe infestation of canker-worms. In an effort to control the situation, I have started a campaign to aerial spray a large area, using one pound of DDT per acre.

Since starting our spray program, however, we have had much criticism from Bird Lovers. I have a lot of respect for the people who are concerned about the birds, and I would not want to hurt them either. However, I am of the impression that the small amount of material involved will do no harm.

We are subscribers to *Agricultural Chemicals*. But I do not have all my old copies. I wonder if you have published anything which may apply to the program with which we are concerned. If there is any information you could refer me to, I would also appreciate that.

Yours very truly,
John C. Kenealy
Tree Warden

IN our reply to Mr. Kenealy we told him that it is impossible to say that no damage will result from such a spray program as he is employing, because it is definitely a relative matter. Some species of birds will definitely be killed by spray applications at even as low a rate as one pound of DDT per acre; however others of the species will rapidly repopulate the area. Birds in the sprayed area will definitely suffer some injury, but with minimum dosages the injury should not be extensive. Of course the destruction of insects will cause the birds to move about temporarily in search of food.

We referred Mr. Kenealy also to the following summaries relative to the effect of insecticides on wildlife:

(1) James R. Fielding and William P. Baldwin, U. S. Fish and Wildlife Service, Washington, D. C. "Effect of Some New Insecticides on Fish and Wildlife." pp. 73-97. 1954 Pesticide Handbook. North Caroline State College, Raleigh, North Carolina. 33 references.

(2) James R. Fielding and William P. Baldwin, U. S. Fish and Wildlife Service, Washington, D. C. "Effect of Some New Insecticides on Fish and Wildlife." pp. 84-99. 1955 Pesticide Handbook. North Carolina State College, Raleigh, North Carolina. 33 references.

(3) Paul F. Springer, U. S. Fish and Wildlife Service, Laurel, Maryland. Plant Pesticides and Wildlife. (Includes both fungicides and herbicides) pp. 101-114. 1955 Pesticide Handbook. North Carolina State College, Raleigh, North Carolina. 64 references.

It is pointed out in these summaries that even the lightest applications of some of the pesticides, including DDT, will have some effect on organisms in the environment. To quote page 87 of the 1955 Handbook:

"These tabular data are the background for recommendations made by the U. S. Fish and Wildlife Service. Linduska, in discussing the relationship of DDT to the 'balance of nature,' points out that even the lightest applications of an ounce or two per acre for certain mosquito control operations can produce enormous kills in other groups of insects. In this manner, *repeated* applications of DDT can not only build up concentrations of DDT in a habitat, but also drastically affect the arthropod food chain supporting bird and mammal populations.

" In forest sprayings of one pound of DDT per acre, a single application usually causes temporary reduction in many insects, but birds are not affected, nor are their nestlings. A dosage of five pounds per acre, however, results in a marked kill of songbirds. Studies on 20 species of forest mammals indicate that the critical aerial dosage is probably about five pounds per acre. On salt marshes, where the full force of aerial application may be felt, even dosages of about a pound drastically reduce populations of blue crabs, fiddler crabs, and certain shrimp and fish, all of which make up the principal food of clapper rails, raccoons, gulls and other marsh vertebrates."

———"In forest areas use less than two pounds of DDT to an acre to avoid damage to birds, amphibians and mammals. Because of the great toxicity to many aquatic forms, use

(*Continued on Page* 117)

Effect of Borate Additives on HERBICIDES

INCONSISTENT and unpredictable results in action of 2,4-D (2,4-dichlorophenoxy-acetic acid) and similar compounds as herbicides when used as soil applied pre-emergence treatments were early and widely reported by investigators at the North Central Weed Control Conference.* The use of 2,4-D as a pre-emergence treatment has never become widely established despite occasional reports of excellent results in field practice or experimentation. Crafts, (1) DeRose, (3) and others, early investigated factors determining the fate of these organic herbicides in the soil and discovered several quite distinct naturally occurring soil factors that limited the action of organic pesticides. They showed that microorganisms—bacteria and fungi—reduced such compounds as 2,4-D to ineffective compounds; complex or basic chemical reactions inactivated the herbicide; or, physical adsorption on colloids, or bacteria sequestered the 2,4-D molecules and rendered the compound inactive.

Studies at the research laboratories of Pacific Coast Borax Co. were concerned with ways and means of improving and extending the desirable action of organic pesticides through the use of additives to prevent or buffer the biological, chemical or physical factors mentioned above. This report is concerned primarily with investigations on control of microorganic activity in the soil.

Early studies showed that compounds such as 2,4-D are readily utilized as nutrients by microorganisms occuring naturally in the soil, and that growth of these organisms may be actually accelerated by additions of 2,4-D within certain limits. In establishing this, a standard potato nutrient agar medium was used as culture in Petri dishes, and the medium incubated at 30°C. Calculated quantities of several organic herbicides at rates equivalent to 0.075 lbs. per 100 sq. ft., 0.150 lbs. per 100 sq. ft. or 0.300 lbs. per 100 sq. ft. of soil surface was added to replicated dishes of culture. The lowest rate of application here is approximately equivalent to 33 lbs. of the herbicidal material per acre, and the range of rates adequately covers the range of applications generally necessary for control of such deep rooted perennial weeds as Canada thistle or leafy spurge, with the acid of 2,4-D under ideal field conditions. The previously sterilized dishes of media were then uniformly inoculated with a water infusion from fresh garden soil and incubated for seven days. The effect of these selected rates of addition of a sodium salt of 2,4-D on development and growth of soil microorganisms introduced by the soil water infusion inoculation as compared to the growth on the check plate is illustrated in Figure 1.

The growth of soil microorganisms was apparently accelerated in proportion to the added increments of 2,4-D. This bears out earlier reported work and, further, illustrates the ability of soil microorganisms to tolerate and actually utilize concentrations of the 2,4-D acid far above anything previously reported. In these investigations many other organic pesticides showed a similar reaction when likewise tested. Following this prelimi-

Figure 1. Extreme Left: Growth of soil microorganisms was accelerated in proportion to added increments of 2,4-D. Plates 30, 31 and 33 had additions of 0.075 lbs., 0.150 lbs and 0.300 lbs. equivalent per 100 sq. ft., respectively. Check plate had no addition of 2,4-D.

Figure 2. Photo at Right: Inoculated culture medium showing the biostatic effect of sodium borate additions to 2,4-D on the growth of soil microorganisms. Plate 2 was treated with 2 lbs. equivalent per 100 sq. ft. of a 2,4-D acid 7.5%/ sodium borate 92.5% complex.

Figure 3. Chart at Left: Depression of growth of Kanota Oat seedlings resulting from pre-emergence treatments with several herbicidal materials. Rates are the equivalent of single ingredients in 1 lb./100 sq. ft. of DB-Granular or equivalent rates of the complex. August 1954.

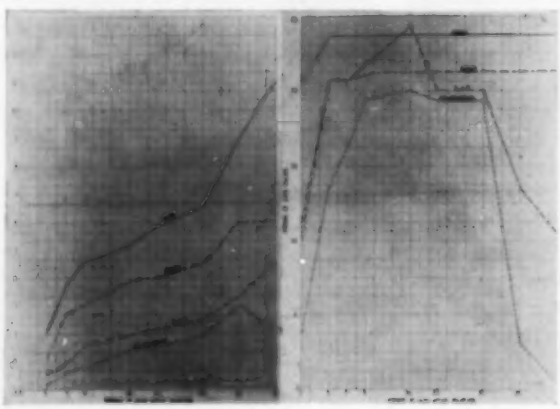

Figure 4. Chart at Right: Number of Kanota oat seedlings surviving pre - emergence treatments with several herbicidal materials. 25 seeds used in each of 3 replicated containers. Rates of application are the equivalent of single ingredients in 1 lb. per 100 sq. ft. treatments with DB - Granular or equivalent rates of the complex. August 1954.

*Paper presented at the North Central Weed Control Conference, held December, 1954 in Fargo, N. D.

By J. D. Stone & D. W. Rahe
Pacific Coast Borax Co.
Los Angeles, Calif.

nary work, which gave striking evidence of the natural ability of bacteria and fungi occurring in the soil to utilize and break down organic pesticidal compounds such as 2,4-D —which obviously limit the usefulness of the pesticidal compounds— numerous tests were undertaken to determine the practicability of adding to the pesticidal compound, in formulation or application, an ingredient that would depress, limit or prevent the growth or activity of microorganisms that feed on, or decompose these organic pesticidal compounds. For practical field application, such an additive must be inexpensive, readily available, adaptable to water spray, or dry application and must have chemical and physical characteristics compatible with the physical, chemical and end use characteristics of a wide range of the pesticides of interest. In these studies, the sodium salt of 2,4-D was selected as a standard test material representing the organic pesticides generally applicable to soil treatment.

Among additives tested as possible microorganism control agents, pentachlorophenol and its salts, or, sodium or calcium borate salts gave initial test indications of being both effective in reducing the activity of the soil-born organisms, and at the same time economical from a possible use viewpoint. Disagreeable handling characteristics of the pentachlorophenol or its salts, coupled with the limited effective period of action in the soil, discouraged continued study of these compounds. The sodium borates, themselves, having desirable herbicidal characteristics and meeting other obvious requirements, were thoroughly investigated.

Fungal and bacterial growth was completely inhibited on culture media treated with 2 lbs. equivalent per 100 sq. ft. of a 2,4-D acid 7.5% sodium borate 92.5% mixture. This culture medium was inoculated with a soil water infusion and incubated for seven days. These results are illustrated in Figure II.

As a further test of the biostatic effect of this range of borate additions to 2,4-D applied to the soil, additional tests were undertaken, using techniques which were earlier and successfully used by Nelson (5) and Kratochvil (4) in studying the effect of microorganisms on various organic and inorganic herbicidal compounds. This method consists of incubating naturally inoculated soil, to which has been added dextrose as additional culture medium in Erlenmeyer flasks, building up activity of the microorganisms to a maximum, then by closing the flasks, collecting CO_2 evolved by metabolism of the microorganisms and determining the relative activity of the organisms resulting from test treatments on the basis of CO_2 evolved in a given time in mm of mercury pressure, by use of a simple mercury manometer. The use of a suitable bactericide and fungicide, such as xylene, in check treatments serves to assure the investigator that evolution of gas is resulting from biological activity in his sample rather than from chemical reactions or decomposition.

Table I shows selected data from one of the tests of this type, which was undertaken to determine the efficiency of sodium borate additions to 2,4-D in depressing or controlling micro-activity in the soil, following closely the techniques reported by Kratochvil (4). The check treatment which had no herbicidal additive showed micro-activity to be uniform at a relative high level on the 4th, 5th, 6th and 7th days of incubation. Treatments to which 0.150 lbs. 2,4-D acid equivalent per 100 sq. ft. were added also showed micro-activity was high and uniform throughout the 4th, 5th, 6th and 7th days of incubation. The sodium borate addition treatments at the rate of 2 lbs. per 100 sq. ft. showed that micro-activity as measured by evolution of CO_2 was, for all practical purposes, non existent. Treatments of the material listed as DB-Granular, equivalent to 2 lbs. per 100 sq. ft., and which is a complex of 7.5% 2,4-D acid equivalent/92.5% sodium borate, in these tests showed practically no micro-activity as indicated by CO_2 pressure determinations on the 4th, 5th, 6th and 7th days.

Replicated check treatments to which xylene was added and which were carried consistently with these determinations, showed 0 or -0 pressure throughout the course of the investigations and indicated that gases

Table I — Effects of Herbicidal Chemical Additions on Metabolism of Soil Microorganisms as Measured by CO_2 Evolution. September 1954*

Additions to Media	Mm Mercury Pressure of CO_2 Evolved in 4 hour Incubation Periods After Incubation For: 4 Days	5 Days	6 Days	7 Days
Check — No Additive	3.32	2.90	4.40	3.50
2,4-D Acid Equivalent to 0.150 lbs./100 sq. ft.	3.82	3.30	3.02	2.40
DB-Granular Equivalent to 2 lbs./100 sq. ft.	0.00	0.23	0.00	0.05
Sodium Borate Equivalent to 2 lbs./100 sq. ft.	0.00	0.18	0.40	0.00
Xylene	—0.50	—0.20	0.00	0.00

*Using method reported by Kratochvil in *WEEDS*, Vol. 1, No. 1, pp 25-31, October 1951: Determinations on the effect of several herbicides on soil microorganisms.

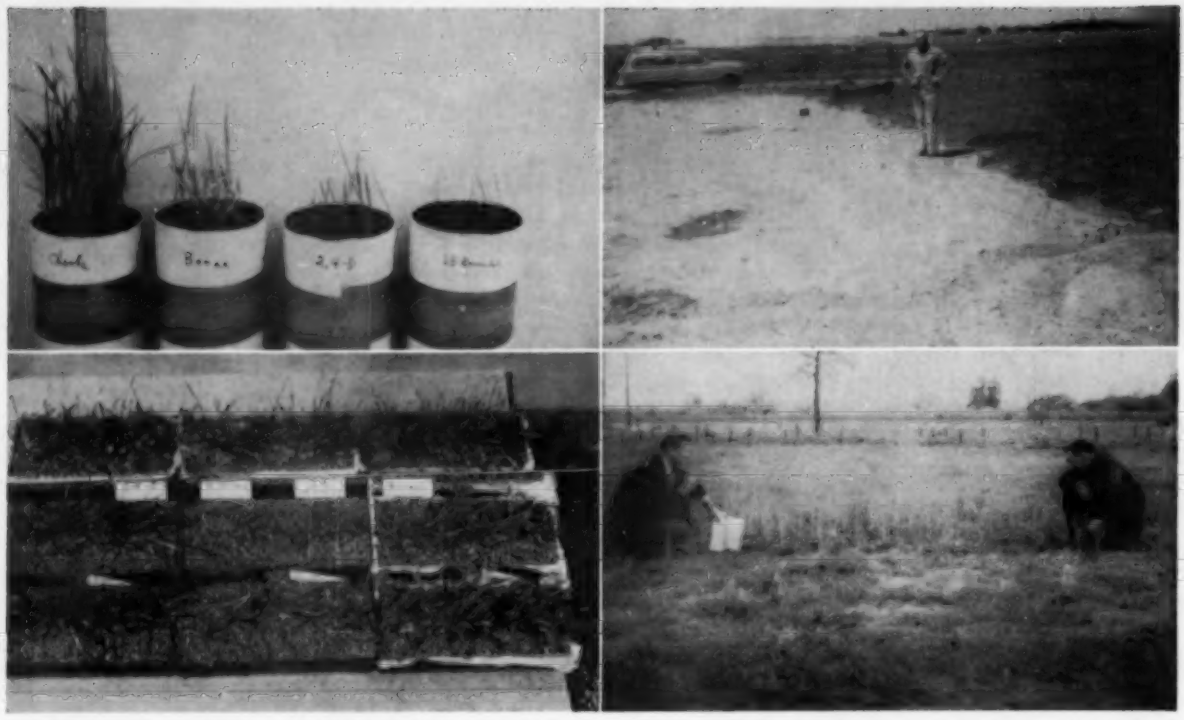

Figure 5. Top: Appearance of plants in a test treatment from which data of Fgures III or IV were derived. Note the increased herbicidal effectiveness of the combination of ingredients included in the complex—DB-Granular.

Figure 6. Bottom: Kanota oat seedlings in greenhouse plots 15 days after the third consecutive planting. Herbicidal treatments were made only at time of first planting. Pans in the background are untreated checks. Pans in the foreground—left to right—received 1 lb. per 100 sq. ft. equivalent of 2,4-D, 2,44-D/borax complex and borax, respectively. Center row-left to right-2 lbs. per 100 sq. ft. equivalent of 2,4-D, 2,4-D/borax complex and borax,respectively.

Figure 7. Top: Field bindweed (Convolvulos arvensis) ten months after application of DB-Granular at rate of 1.5 lbs. per 100 sq. ft.

Bottom: Russian knapweed (Centaurea picris) twelve months after applying DB-Granular at rate of 2 lbs. per 100 sq. ft. Note: Regrowth of grasses on treated area in foreground, and knapwood on check plot in background.

evolved were resulting from microbiological activity and not from chemical reactions or decomposition. The data of Table I, while bearing out work earlier reported by Kratochvil (4) on 2,4-D, are reported here on investigations in which vastly greater quantities of 2,4-D were used.

The next step in these investigations involved the testing of selected compositions in the greenhouse. The data of these investigations, which are presented here, are all based on treatments made with a complex composed of 7.5% 2,4-D acid equivalent combined with 92.5% of a selected sodium borate, and which has been experimentally tested widely during 1954 as DB-Granular. This is an experimental designation given this material, and which was found through numerous tests as approaching the maximum in efficiency for borate/2,4-D acid complexes. In the greenhouse tests, a good garden soil mixture was used (this soil was of the same source and composition used in making the micro-activity determinations of Table I). In early tests, tall quart ice cream containers were used as pots. Test plants included mustard (*Brassica arvensis*) and Kanota oats. The first represent a species highly susceptible to 2,4-D, the latter relatively tolerant. In initial pot tests, the soil was added to the containers, brought to field moisture level, and the oat and mustard seeds (25 each) planted and the herbicidal compounds added to the soil surface and leached in by sufficient sprinkling necessary to maintain good growing conditions. The plants were grown for 30 days, with plant count and growth measure determinations taken at regular intervals, then water was withheld to kill any remaining plants, and without further addition of the herbicidal compounds second and third plantings were made to determine the residual herbicidal qualities of the compositions under test. Each successive planting was grown for 30 days.

Typical data from first planting determinations are shown in Figures III and IV. In plotting the growth rate of surviving Kanota oat seedlings for check and treated triplicate plot tests as shown in Figure III, it is evident that the addition of the borax equivalent of 1 lb. per 100 sq. ft. of the complex as a pre-emergence application resulted in considerable depression of the plants as measured by growth. This rate is, however, considerably below levels recommended for herbicidal use. The 2,4-D acid equivalent of a like treatment of the complex gave markedly greater depression of growth height of oat seedlings and the combined effect of the borate and 2,4-D acid in the complex gave the greatest depression of any of the treatments. The data of

(*Continued on Page* 123)

PART II

1954 Fungicide Tests

Turf Plants

Blue grass

"GOING-out" disease of Kentucky blue grass, caused by *Helminthosporium vagans*, was controlled successfully in Rhode Island by early applications of fungicides (36a). Best control was obtained with 1.6 oz. of 10 per cent phenylmercury acetate applied to 1,000 sq. feet. Two chromium complexes, Krominate (0.4 oz.) and MCW-A935 (0.4 oz.) also controlled the disease. The fungus did not attack crowns and roots of Merion blue grass, and fungicides were not required to prevent serious damage to this variety.

In New York (22b) some control of "going-out" "fading out " (caused by *Curvularia* sp.) was obtained when either of 5 fungicides was applied, beginning in May (Table 17).

Bent grasses

AN autumn application of one of the mercury-containing or cadmium-containing fungicides controlled snow mold in Seaside Bent golf greens in Washington (Table 18). Tersan 75, Special Semesan, and Spergon were not as effective as mercury or cadmium compounds.

Brown patch of Astoria Colonial Bent and of Rhode Island Colonial Bent was most effectively controlled by timely applications of Calo-chlor and Calocure (Tables 19 and 20). CuMH was highly phytotoxic.

Results of tests for control of Sclerotinia dollar spot and Cercospora copper spot of bent grasses in Michigan and New Jersey appear in Tables 21 and 22. In New Jersey (22a), Cercospora copper spot was suppressed by August 20-August 31 applications of DuPont EMTS at 2 oz. or 4 oz./1000 sq. feet.

TABLE 17.
Rating of fungicides applied to turf plots for control of "going-out" and "fading-out" diseases (22b).

Fungicide	Rate/1000 sq. ft.	Disease Control "going-out"	Disease Control "fading-out"
Acti-dione	0.5 gm.	Good	None to Fair
Acti-dione	1.0 gm.	Good	None to Fair
PMAS	0.1 pt.	Good	Good
Puraturf	0.2 pt.	Good	Good
Puraturf 177	1.6 oz.	Fair to Good	Fair to Good

TABLE 18.
Materials tested for snow mold control in Washington (47a).

Material[a]	1000 Sq. Ft.	Application Method	% Snow Mold Pullman Fusarium nivale	% Snow Mold Spokane Typhula itoana
Check	—	—	48.0	26.7
PMA—Solubilized No. 10	2 oz.	Wet	1.7	—
	.1 pint	"	—	1.5
	.2 pint	"	—	0.0
PMAS	2 oz.	Wet	1.8	—
	.1 pint	"	—	3.5
	.2 pint	"	—	0.0
Cadminate	2 oz.	Wet	3.8	0.0
	4 oz.	"	—	0.0
Tersan 75	3 oz.	Wet	—	4.0
	6 oz.	"	38.0	1.5
Calo Clor	2 oz.	Dry	—	5.7
	3 oz.	"	4.8	4.0
Calo Cure	3 oz.	Dry	17.5	6.2
	4 oz.	"	—	4.7
Spergon	3 oz.	Wet	—	2.2
	6 oz.	"	35.5	6.7
Special Semesan	3 oz.	Dry	—	17.5
	5 oz.	Wet	9.6	—
	6 oz.	Dry	—	9.7
Tat-C-Lect	2 oz.	Wet	1.7	—
Puraturf	3 oz.	Wet	2.0	—
Puraturf GG	1 oz.	Wet	10.6	—

[a] Applied in mid-November at Spokane and late November at Pullman on Seaside Bent golf greens (fertilized for final time in August); disease records taken early in March, 1953. Sprays applied at 5 gallons/1000 square feet, and dry applications mixed with sand and applied at 10 quarts/1000 square feet. Very little snow covered the ground during the winter.

TABLE 19
Results of tests for control of brown patch of Astoria Colonial Bent in Rhode Island (36a).

Fungicide	Rate/ 100 sq. ft.	Amt. of Disease % plot area affected
None	—	41.0
Calocure[a]	2 oz.	3.0
Calocure plus Tersan 75[a]	1 oz. plus 1 oz.	2.0
Tersan 75[a]	2 oz.	15.2
Captan 50W[a]	2 oz.	17.0
Tersan 75[b]	35.7 oz.	19.8
Phygon plus Nugreen[b]	23.8 oz. plus 53.3 oz.	31.0

[a] Seven applications at 14-day intervals begining June 12. Ten gal. of spray applied to each 1000 sq. ft.
[b] Two applications, June 26 and July 24, as a soil drench to provide 0.855 in water.

TABLE 20
Performance of materials tested for brown patch control in Rhode Island Colonial Bent turf plots (36a).

Material	Rate 1000 sq. ft.	Amt. of Disease % plot area affected
None	—	11.2
Acti-dione[a]	0.5 oz.	23.8
Calo-Chlor[a]	1 oz.	14.6
Crag 531[a]	3 oz.	25.4
Endomycin[a]	0.65 gm.	19.6
Krominate[a]	0.5 oz.	14.0
MCW 84[a]	1 oz.	18.6
A-935[a]	0.2 oz.	14.6
Liquiphen[a]	0.33 oz.	20.6
Calo-Chlor[b]	2 oz.	1.6
Calocure[b]	2 oz.	3.0
Cadminate[c]	11.9 oz.	8.8
Captan 50W[c]	11.9 oz.	9.8
Calo-Chlor[c]	35.7 oz. then 11.9 oz.	2.0
CuMH[d]	71.4 oz.	—[d]
PS-242[c]	12 oz.	26.0
Krominate[c]	5.49 oz.	9.0
Phygon XL[c]	23.8 oz.	5.8
Nugreen[c]	53.3 oz.	0.8
Tersan 75[c]	35.7 oz.	1.4
8 HQB[c]	17.84 oz.	15.6

[a] Seven applications at 14-day intervals, beginning on June 26.
[b] Three weekly applications, beginning June 26.
[c] Two applications, June 26 and July 24, as soil drench to provide 0.855 in. water.
[d] Chemical killed plants.

Fescue in mixtures

MERCURIALS gave good control of snow mold (Table 23), and, contrary to its performance when tested on bent grasses in the United States, Tersan 75 was as effective as many mercurials.

In turf plots composed of mixtures of Browntop and Chewing's Fescue, good control of Corticium red Thread disease was obtained by 4 applications (between July 31 and September 1) of dry Merfusan (3.5 lb. and 8 lb. sand/1000 sq. ft.), Experimental Mercury Form 1 (7.1 oz.),

TABLE 21

Performance of materials used on Seaside Bent and Washington Bent turfs in Michigan for control of dollar spot (19a).

Material[a]	Rate/ 1000 sq. ft.	Disease Rating[b] Seaside Bent	Wash. Bent
None	—	4.5	4.7
Calo-Clor	2 oz.	0	—
Cadminate	0.4 oz.	0	—
Crag 531	3 oz.	0.5	—
Acti-dione plus Urea	0.6 gm. plus 5.3 oz.	0.5	—
Acti-dione	0.6 gm.	1.5	2.0
Acti-dione plus Methocel	0.6 gm. plus 5.3 oz.	1.5	—
Tersan	3 oz.	2.75	4.2
Velsicol	3 oz.	2.0	—

[a]Three applications, July 27, Aug. 6, and Aug. 21; exception: Velsicol applied on Aug. 21 only.
[b]Number of spots/sq. ft. on Sept. 2. 0 = less than 1; 1 = 1-3 spots; 2 = 3-10 spots; 3 = 10-20 spots; 4 = 20-40 spots; 5 = more than 40 spots.

Bordeaux plus Malachite XTRA (1.8 oz.), Tersan 75 (1.5 oz.), Puraturf (0.1 pt.), and Crag 531 (1.5 oz.). Fungicides which were not effective are: wet or dry Verdasan (0.85 oz.), Experimental Mercury Form B (0.02 pt.), Experimental Mercury Form D (0.01 pt.), and Orthocide (1.5 oz.).

Rye Grass

WHEN used at 14-day intervals, Calocure (2 oz./1000 sq. ft.) and Cadminate (0.5 oz.) controlled dollar spot, but Acti-dione (0.5 oz.) gave only poor control (11a).

TABLE 22

Performance of materials tested for copper spot and dollar spot control in New Jersey (22a).

Material[a]	Rate Per 1000 Sq. Ft.	Ave. No. Copper Spots Per Plot	Ave. No. Dollar Spots Per Plot
None	—	281	15.6
Calo Clor	2 oz.	69	1.0
Calo Clor	1 oz.	161	3.5
Tersan 75	3 oz.	397	1.5
Tersan 75	1¾ oz.	474	2.5
C. Clor + Tersan	1 + 1¾ oz.	61	5.3
Calo Cure	2 oz.	171	1.0
PMAS	1 fl. oz.	9	4.3
Puraturf	0.1 pint	5	2.6
Puraturf 177	0.6 oz.	7	1.6
Puraturf 1100	0.1 pint	315	2.0
Crag 531	3 oz.	22	3.1
Cadminate	0.5 oz.	7	2.1
Krominate	0.5 oz.	53	0
Captan 50W	3 oz.	503	3.3
Actidione	0.5 oz.	215	2.6
PMAS (Dry)[b]	2.7 oz.	96	1.3
Vancide 51	0.5 pint	358	0.5

[a]Seven applications at 10 day intervals between July 10 and September 10 on *Seaside Creeping Bent*. Sprays applied at 5 gallons/1000 square feet, and dry material at rate shown in Table.
[b]PMAS adsorbed on Milorganite at rate of 6 ozs. of 10% PMAS per 10 pounds and applied dry at rate of 27 ozs. of PHAC-Milorganite combination.

Field Crops

Corn

SEED treatment with some chemicals resulted in approximately 10 percent yield increases in dent corn plots in Iowa (Table 24). Although plots grown from seed treated with Dithane D-14 plus sticker and zinc chloride produced the highest yields, plots from seed which had been treated with Dithane D-14 plus sticker yielded less than any others.

Any one of 5 seed treatment materials is recommended for damping-off of corn seedlings in Ontario (Table 25).

TABLE 23

Performance of materials tested for snow mold control in England (54).

Material[a]	Rate Per 1000 Sq. Ft.	Area Infected (%) Test I[b] 10-26	11-16	Test II[b] 10-26	11-16	Test III[c] 10-24	11-16
Check	—	10.0	10.1	3.6	6.0	3.3	3.5
Verdasan	2.8 oz.	3.2	2.4	—	—	3.5	1.4
Exp. Hg. Form 1	7.1 oz.	5.0	2.8	—	—	3.3	0.3
Bordeaux Malachite XTRA	1.8 oz.	8.2	4.7	—	—	—	—
Merfusan	7 lb. (DRY)	7.0	2.6	—	—	4.3	0.0
Calo Clor	1.5 oz.	—	—	4.5	2.0	—	—
Crag 531	1.5 oz.	—	—	3.7	2.7	3.0	0.4
Tersan 75	1.5 oz.	—	—	4.4	2.9	2.5	1.5
Puraturf	0.1 pint	—	—	8.4	4.9	3.0	1.0
MG. 1	3.75 lb. (DRY)	—	—	2.2	1.3	—	—
Acti-dione (Ferrated)	1 oz.	—	—	5.8	3.5	—	—
Exp. Hg. Form B	0.04 pint	—	—	4.8	2.3	2.3	1.4
Exp. Hg. Form D	0.08 pint	—	—	—	—	3.5	1.9

[a]Three applications at 7 day intervals between October 26 and November 7. Sprays applied at 2.6 gallons/1000 square feet, and dry materials at rates shown.
[b]Mixtures of annual meadow grass, New Zealand Browntop, and Chewing's fescue. Plots artificially inoculated.
[c]Mixture of Browntop and Chewing's fescue. Natural infections.

TABLE 24

Yield of dent corn plots in Iowa following seed treatments (41).

Seed treatment Material	Conc. oz./bu.	Av. yield bu./A.[a]
Arasan SFX	0.67	79.3
I and D	1	77.2
Arasan and Dieldrin	1	75.7
Orthocide 75	0.67	83.1
None	—	76.0
Panogen	0.67	78.1
Panogen	2	78.6
Spergon	1.5	77.3
Phygon	0.67	88.0
None	—	77.0
Dithane D-14 plus stick (1%)	—	74.1
Dithane D-14 plus sticker (1%) plus 10% $ZnCl_2$ (10%)	66	84.6
"Double 6-4-6 CO_3" + $ZnCl_2$ (10%)	—	82.3
HCl (2%) plus sticker (0.67%)	—	83.4
None	—	77.6

[a]Based on a total of 20 replications involving 3 varieties.

TABLE 25

Materials tested for control of damping-off of corn in Ontario (52).

Seed treatment material	Conc. oz./100 lb. seed	Recommended for grower use
Orthocide 75[a]	1.5	Yes
Phygon	1.5	Yes
Vancide 51	8 (fluid)	Yes
B856C	2	Yes
Panogen	4 (fluid)	Yes
Arasan	2	No
Merculine	2 (fluid)	No

[a]Experimenter's preference.

Orthocide 75 is preferred by the experimenter (52), and Arasan at 2 oz./100 lb. seed and Merculine at 2 fl. oz./100 lb. are not recommended for grower use.

Barley

RESULTS of barley seed treatment experiments are summarized in Table 26.

TABLE 26

Yield of barley plots in Iowa following seed treatments (14).

Seed treatment material	Conc. oz./bu.	Yield bu./A.[a]
DuPont 244	0.5	26.7
DuPont 364	0.5	26.7
Setrete	0.75	26.0
Ceresan M	0.5	25.3
C4-10 plus Orthocide	0.25 and 1	25.2
Mema	—[b]	22.9
"Double" plus 0.5 oz. Arasan SFX	—	22.6
C4-10	0.5	22.1
Panogen	0.75	21.8
None	—	21.6
Arasan SFX	1	20.7
Orthocide 75	2	20.6
Orthocide 75	1	19.7

[a]Based on a total of 16 replications in 2 locations.
[b]Slurry; 0.75 pt./gal.

Oats

RESULTS of experiments to test the effect of chemical seed treatments on emergence of oat seedlings and on yields in field plots are presented in Table 27.

Flax

RESULTS of extensive flax seed treatment trials are presented in Tables 29 and 30.

TABLE 29

Performance of materials tested in flax seed treatments in Iowa (14).

Material[a]	Conc. oz./bu.	Yield bu./A.
Mer-sol	1.5	18.3
Panogen 15	1.5	18.5
DuPont 364	1.5	17.0
Ceresan M	1.5	20.4
Gallotox	2.25	19.4
Puraseed	1.5	14.6
DuPont 244	2.25	19.6
Ceresan M-2X	1.5	19.7
None	—	16.9
Co-op Mercury	1.5	20.0
Leytosan A1	2.0	15.3
Mercal	5.0	18.4
Co-op Hexa	1.5	15.0
No Bunt	1.5	18.4
Vitrioline	1.5	19.7

[a]Materials listed in decreasing order of performance as determined by counts of emerged seedlings.

Soybean

TREATMENT of soybean seed with any one of 7 materials effectively controlled damping-off in Ontario (Table 31).

TABLE 31

Performance of materials tested as seed treatments for the control of damping-off of soybeans (52).

Material	Conc. oz./100 lb. Seed	Order of Disease Control
Orthocide 75[a]	2.5	1
Vancide 51	8 (fluid)	1
Merculine	2 (fluid)	2
Panogen	4 (fluid)	2
Arasan	2	3
Phygon	1.5	3
B856C	2	3

[a]Experimenter's preference, although any one of the materials is recommended for grower use.

Cotton

SEED treatment with B856 dust (0.15% active) effectively eliminated *Colletotrichum gossypii* from re-ginned seed (37). The material was less effective on fuzzy seed or when applied as a slurry.

Damping-off and sore skin, caused by *Rhizoctonia solani*, were controlled by soil treatments with PCNB in South Carolina (37) and California (5) and

TABLE 27

Relative yields and seedling emergence of Cherokee oats following seed treatments (14).

Seed treatment material	Conc. oz./bu.	Emergence % of best[a]	Yield % of best[b]
Ceresan M	0.5	100.0	90.6
Puratized C4-10 plus Orthocide 75	0.25 and 0.75	99.3	86.7
Orthocide 75	1	98.0	86.3
Puratized C4-10	0.5	97.9	100.0
Orthocide 75	2	97.0	84.3
Arasan SFX	1	95.9	86.3
Setrete	0.75	95.9	86.7
DuPont 244	0.5	94.6	91.3
2-step plus Arasan SFX	1% and 0.5	92.0	87.1
DuPont 364	0.5	91.2	89.1
Panogen	0.75	88.9	83.6
Mema (11.4%)	0.24 me.	84.2	85.4
None	—	73.8	19.7

[a]Based on 7 greenhouse tests.
[b]Based on a total of 16 replications in 12 locations.

TABLE 28

Relative performances of soil treatments in the control of damping-off and sore skin of cotton in California (5).

Material	Conc. lb./A.	Order of Disease Control	Order of Yield	Experimenters' preference
PCNB	10	1	1	3
PCNB and captan	5 and 2.5	1	1	2
PCNB[a]	5	1	1	1
maneb	5	2	2	5
zineb	5	2	2	4
captan	2.5	3	2	6
captan	5	3	2	7

[a]Emergence of seedlings delayed in one sandy soil plot.

TABLE 30

Total flax seedling emergence and average acre yield of plots grown from treated seed (14).

Seed treatment material	Conc. oz./bu.	Total No. emerged seedlings[a]	Av. yield bu./A.[b]
Ceresan M	2.0	4386	10.6
Orthocide 75	2.0	3885	10.3
Panogen	2.0	3648	9.9
Arasan SFX	2.0	3132	10.3
None	—	2060	8.8

[a]One replication; 9 varieties.
[b]Five replications; 9 varieties.

TABLE 32

Performance of materials used in South Carolina as soil fumigants to control root knot and root rot of tobacco in seed beds (41).

Soil Fumigant	Amount Used	Order of Disease Control	Recommended for grower Use
Methyl bromide	1 lb./100 sq. ft.	1	Yes
Urea-cyanamide[a]	1 lb. and 0.5 lb. /sq. yd.	1	Yes
Cyanamide-ethylene dibromide[b]	1 lb./sq. yd. and 1.5 qts./100 sq. yd.	1	Yes
Crag 974-cyanamide[a]	160 lb./A. and 1 lb./sq. yd.	2	No
VC 1-13 cyanamide[c]	23 gal./A. and 1 lb./sq. yd.	3	No
Code No. 7001-cyanamide[d]	100 lb./A. and 1 lb./sq. yd	2	No

[a]Dug in.
[b]Injected.
[c]Surface drench and dug in.
[d]Surface drench.

with PCNB and captan in California (Table 28). Maneb and zineb treatments were effective also (5).

Tobacco

ETHER Dithane Z-78 dust or Parzate dust is recommended for tobacco blue mold control in Florida (10). When these materials were applied 3 times a week at dosages varying from 15 to 35 lb./A., depending upon plant size, satisfactory disease control was obtained. Pyrax or Niagara or tobacco diluents were used. Concentration of the active ingredient was 6.5 per cent at each application. Neither Kolo-phygon (1 per cent active) nor Thiolutin (0.05 per cent active) controlled blue mold. LO-738 dust (7.5 per cent active) in tobacco diluent controlled the disease, but is not yet available for grower use.

In spray tests, Fermate (4 lb./100 gal.), Dithane Z-78 (3 lb.), Vancide F956 (4 lb.), and Agrimycin (100-300 ppm) controlled blue mold when applications were made every 4th or 5th day, beginning when the disease was first observed, and continuing for 5 weeks. Agrimycin 200 A was phytotoxic at 200 and 300 ppm, but not so at 100 ppm. Agrimycin 200 C was not phytotoxic at 300 ppm (42).

Agrimycin (100 to 200 ppm) is recommended for tobacco wildfire control in Pennsylvania (36). The disease was controlled when plants in seed beds were sprayed at weekly intervals, beginning when first leaves had reached the size of a dime, and continuing for 3 to 5 weeks. Bordeaux mixture (8-4-100) was phytotoxic, and did not control wildfire.

Results of tests to control root knot and root rot of tobacco by soil fumigation are presented in Tables 32 and 33.

TABLE 33
Soil fumigants used in South Carolina to control root knot and root rot of tobacco in the field (41).

Soil Fumigant*	Amount/ Acre	Recommended for grower use
Ethylene dibromide	8 to 20 gal.	Yes
DD Mixture	7 to 20 gal.	Yes
Crag 974	160 lb.	No

*Applied in the row.

Materials Used to Control Diseases of Field Crops and Turf

CHEMICALS which have been listed earlier along with chemical names and names of manufacturers are: agrimycin, captan, Dithane, Fermate, Manzate, Orthocide, Panogen, Phygon XL, Vancide 51, LO838, and zineb. Other materials used to control field crops and turf diseases are listed at right.

Material	Chemical name of active ingredient
Acti-dione (cycloheximide) (27)	B-[2-(3,5 dimethyl-2 oxocyclohexyl)-2-hydroethyl] glutarimide
Agrox C.	phenyl mercury acetate; ethyl mercury chloride; mercuric oxide
Anticarie	hexachlorobenzene
Arasan (thiram) (D)	bis (dimethylthiocarbamoyl) disulfide
Bordeaux Malachite XTRA (AA)	——
Bunt Cure	hexachlorobenzene
Bunt-No-More	hexachlorobenzene
Cadminate (G)	cadmium succinate
Calo-chlor (G)	mercurous chloride; mercuric chloride
Calocure (B)	reaction product of copper sulfate and sodium dichromate
Captan 50-" (T)	see captan
Ceresan M, M-2X (D)	N-(ethylmercuri)-p-toluenesulfonanilide
Co-op Mercury	——
Co-op Hexa	——
Crag Turf fungicide 531 (B)	copper cadmium zinc calcium chromate
Crag Industrial Fungicide 974 (B)	3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione
CuMH	Copper salt of maleic hydrazide
DD Mixture (S)	1,3-dichloropropene; 1,2-dichloropropane
Dowfume W40 (C)	1,2-dibromoethane
EMTS (D)	ethylmercuri-p-toluene sulfonanilide
Endomycin	an antibiotic
Ethylene dibromide	1,2-dibromoethane
Gallotox	phenylmercuriammonium acetate
I and D Seed Protectant	bis-(dimethylthiocarbamoyl) disulfide; -1,2,3,4,5,6-hexachlorocyclohexane
Kolo-phygon	sulfur; 2,3-dichloro-1,4-naphthoquinone
Krominate (G)	a cadmium complex
Leytosan G91	phenylmercuriurea; -1,2,3,4,5,6-hexachlorocyclohexane
Leytosol C	phenylmercuriurea
Liquiphen (WW)	phenylmercury thiocyanate
Liquisan	——
MEMA	methoxyethylmercury acetate
Mercal	——
Merculine	phenylmercury salicylate
Mercury-lindane	——
Mercusol	——
Merfusan (HH)	mercuric chloride; mercurous chloride.
Mergamma C	phenylmercury acetate; ethylmercury chloride; -1,2,3,4,5,6-hexachlorocyclohexane
Merlane	same as Mergamma C
Mer-sol	——
Methocel	methyl cellulose
Methyl Bromide	bromomethane
No Bunt	hexachlorobenzene
Parzate (D)	see zineb
PCNB (I)	pentachloronitrobenzene
Phygon (V)	see dichlone
PMAS (BB	phenylmercury acetate
Puraseed (E)	phenylmercury formamide; anilinocadmium lactate
Puratized C4-10 (E)	phenylmercury lactate
Puratized C-13-1212 (E)	same as Puraseed
Puraturf (E)	tris-(2 hydroxyethyl) (phenylmercuri) ammonium lactate
Puraturf 177 (E)	anilinocadmium lactate
Puraturf 1100 (E)	a non-metallic proprietary compound
Puraturf GG (E)	tris-(2 hydroxyethyl) (phenylmercuri) ammonium lactate; tris-(2 hydroxyethyl) cadmium ammonium lactate
San	——
Setrete	——
Special Semesan (D)	2-chloro-4(hydroxymercuri) phenol; 4 (hydroxymercuri)-o-cresol; and isomers
Spergon (chloranil) (V)	tetrachloro-p-benzoquinone
Tat-C-Lect (F)	phenylmercury acetate

(Continued on Page 113)

Practical information on acid forming Fertilizers

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THE terms: "physiologically acid fertilizers," "acidity or basicity equivalence," and "acid-forming fertilizers," are, no doubt familiar to most people in fertilizer industry. Several years ago they were bandied about much more than at present; but in some areas, some farmers and competitive fertilizer salesmen still continue to worry field men about this subject. This year the question is again brought up, and it seems worthwhile to review factual data a field representative can use as needed.

Certain nitrogenous fertilizers tend to increase soil acidity whether used alone or in mixed fertilizers. Best known among these are ammonium sulfate, urea, ammonium phosphate, ammonium nitrate, and anhydrous ammonia. How do these ammoniates cause soil acidity? Is such acidity a real problem for the farmer? Briefly, the facts are these:

Ammonia nitrogen rapidly changes to nitrate nitrogen in the soil. In the spring, most ammonia nitrogen is converted by soil organisms to nitrate nitrogen within 30 to 60 days, depending upon soil temperature. Nitrate nitrogen then combines with calcium or magnesium or both to form calcium nitrate and magnesium nitrate; and may also combine with sodium and potassium to form the nitrate salts of each of these elements: sodium nitrate; potassium nitrate. When the nitrate nitrogen takes on calcium, magnesium or potassium off the clay and humus complex of the soil, the element hydrogen replaces them and the clay becomes acid. Remember, hydrogen is the element which creates acidity: this fact you will recall is associated with the symbol, "pH," which is the scientists' method of measuring the concentration of hydrogen ions. Now, recall that nitrates are formed when combined with calcium, magnesium, or potassium; having been so formed, they stay in the soil solution until used by the growing plants, or they leach out of the soil with drainage water. When they leach out, they remove so much lime, magnesium or potassium which are combined with the nitrate nitrogen.

Soils with a high content of lime will lose 3.57 pounds of lime with each pound of nitrogen leached out. Or, we can say that each unit of nitrogen (20 lbs. N) will remove 36 pounds of lime ($CaCO_3$). Other elements are lost also, as was noted previously; but ordinarily the amount of lime in a soil is so much greater than magnesium that more of it is lost by the leaching out of the nitrate nitrogen process.

Ammonium sulfate contains nitrogen and sulfur, both of which are acid forming. To convert the nitrogen to calcium nitrate requires, as previously shown, 3.57 pounds of pure lime per pound of nitrogen. The conversion of one pound of sulfur to calcium sulfate also requires 3.57 pounds of pure lime: Therefore, a total of 7.14 pounds of pure lime are consumed in converting the ammonium sulfate into calicum nitrate and calcium sulfate.

The Factor 3.57

SO we see that to convert each pound of ammonia nitrogen to nitrate requires 3.57 pounds of pure lime. And when the resulting water-soluble calcium compounds are leached out of the soil, hydrogen replaces the calcium and acidity results. The chemical method employed for calculating the effect of fertilizers on the lime content of the soil considers that the sulfur, the chlorine, one-third of the phosphorus and only one-half of the nitrogen reduce the lime content of the soil. But one must remember that not all of the nitrogen in the applied fertilizer is leached out as a calcium salt: a good portion of it, certainly, is utilized by the growing crop. Hence, the theoretical potential acidity of a fertilizer is not always the amount which actually develops in the soil; most of the time it is considerably less. In fact, in recent years, several soil scientists of high repute have questioned the fairness of the present official method of determining the acidity of a nitrogen-containing fertilizer in terms of calcium carbonate equivalence.

The following quotes are pertinent to this discussion:

Dr. W. B. Andrews, Mississippi Agr. Experiment Station Authority, in his text book on fertilizers says:

(Continued on Page 115)

Evaluation of Methods for Control of . . . Flies

By R. E. McKenzie and Harry L. Haynes*

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THE losses caused by ectoparasites attacking livestock have been recognized for a long time. The benefits derived from chemical control and the farmer's awareness of the need for increased food production are making him more conscious of the high losses of meat and milk products due to biting flies. This paper will be devoted to a brief presentation covering certain losses involved, methods of chemical control and economics of controlling the major group of these pests, the biting flies, encountered in the field and pasture.

U.S.D.A. entomologists estimate that livestock pests cost this country each year about 500 million dollars, mostly in wasted feed, lower production of meat and milk, and damaged hides. Of this total, about 30% or 150 million dollars is due to horn, stable and horse flies. A primary cause of the losses from flies is due to the nuisance aspect of these pests. Cattle lose weight and expend energy if they have to fight off flies. It has been estimated that draining of blood by large numbers of horse and stable flies may result in the loss of three or more ounces of blood a day. Most important of all, however, is that flies cause cattle to lose much valuable grazing time, resulting in less food intake. All these factors cause lower milk or beef production and leave the animal in a weakened condition.

Published data have indicated that chemical control of flies on livestock results in increased beef and milk production. For example, range cattle sprayed with DDT for horn fly control have gained one-half pound in weight a day more than untreated animals. Horn flies can also reduce milk flow in cows as much as 20% a day.

It is profitable for the farmer to control these biting flies by the use of chemical sprays. The 1952 Yearbook of Agriculture presented figures showing an estimated saving of 47 million dollars by applying fly control materials to 13 million animals in 28 states. This figure does not include treatments made for grubs, lice, ticks and related pests.

In our own 1954 field tests, cooperators in southern New Jersey reported that dairy cows sprayed with repellent-toxicant combinations produced approximately 20% more milk than untreated animals.

The following 1954 fly control data were excerpted from a report by Dr. L. K. Cutkomp of the University of Minnesota. These data illustrated that an animal fly control program can be a profit-returning investment for the farmer (Table 1).

Repellent-Toxicant Combinations

COMPLETE eradication of horn, stable and horse flies by a combination of sanitary practices, with supplementary chemical controls would be ideal. Unfortunately, the term sanitary practices involves such herculean tasks as removal or spreading out to dry of all fresh manure from pastures, and drainage of swampy horse fly breeding locations. Preventive and sanitary measures, which are very effective against house flies, are not always applicable to control of biting flies because of dif-

TABLE I

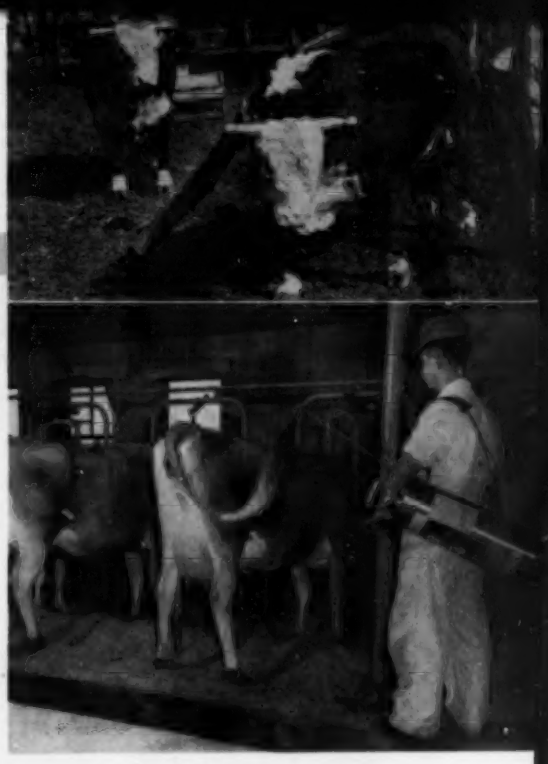
Increased Weight Gains and Values of Heifers by Controlling Flies* Treadle sprayer application. Minnesota, 1954.

Formulation	Weight gain per heifer	Cost of spray	Value of increased beef	Increased value due to spraying
LOT A				
Repellent-Toxicant Mixture: 50% Crag Fly Repellent, 10% Sulfoxide Pyrexcel Concentrate	25.3 lbs.	$1.05	$5.06	$4.01
LOT 4				
Untreated	0.3 lbs.	—	—	—

*Two nozzle automatic treadle sprayers were calibrated to deliver 0.5 to 0.6 cc. per nozzle per treadle depression. Each lot constituted 4 heifers on an equal sized area with similar forage conditions. Fly populations averaged 0.4 horn flies and 6.3 stable flies on treated animals and 58.0 horn flies and 13.3 stable flies on untreated animals. The test period, 6 weeks, was June 16 to August 9.

*Presented in Insecticide Division, December 7, 1954, meeting of the Chemical Specialties Manufacturers Association, in New York.

on Livestock



Top Photo: Back rubbers are convenient self-treating devices. Cattle rub the repellent toxicant mixture on their backs, and can treat the underline as well.

Bottom Photo: Water sprays give excellent protection against biting flies for comparatively long periods. Another advantage of this method of treatment is dilution with water, a safe and inexpensive diluent.

ferences in breeding habits and areas involved.

Since biting fly species depend on the blood of mammals for all or part of their food supply, some entomologists have recommended placing mechanical or chemical barriers between the insect and its food supply.

Keeping horses and cattle in screened stables at night, and the use of muslin covers during the day for the animals have been suggested as mechanical barriers. In recent years, the development of chemical barriers employing toxicants and repellents have become increasingly important.

A chemical barrier, which is provided by a livestock spray, should protect animals from the bites of these flies. Therefore, a chemical barrier consisting of a non-repellent toxicant alone, which may allow serious biting, is not effective even though the flies may absorb a lethal dose of toxicant and die minutes or hours later. The use of certain types of repellent-toxicant mixtures suggested in this paper provide a protective barrier which will prevent flies from biting, and kill the flies which do alight on the animal as the repellent barrier wears off.

A judicious selection of the toxicant and repellent in a formulation with due regard for physical properties results in additional benefits. For example, when a repellent such as butoxypolypropylene glycol is combined with certain toxicants, both the toxic and repellent properties of the mixture are enhanced. The repellent properties of butoxypolypropylene glycol alone and in combination with toxicants have been described; (1), (2), (3), (4), (5), (6), (7), (8), (9) and (10).

Data from these workers indicate also that butoxypolypropylene has mild synergistic and stabilizing properties for synergized pyrethrins and its repellent activity is not reduced in the presence of synthetic sweat. Its very low order of mammalian toxicity has been described (11).

Recent laboratory tests have shown that combinations of butoxypolypropylene glycol and methoxychlor provide an evenly dispersed, moist clinging residue, which is resistant to flaking. Field tests in 12 states (New York, New Jersey, South Carolina, Massachusetts, Maine, New Hampshire, Pennsylvania, Michigan, Iowa, Arkansas, Oklahoma, Missouri) during the past two years have indicated that such a repellent-toxicant combination is a safe, efficient and economical animal protectant.

Typical field results with this repellent-toxicant combination are presented in Table 2 using a synergized pyrethrins spray as a standard, and untreated animals as a check.

TABLE II

Repellent Tests with Water Emulsion Sprays Against Mixed Populations of Horn and Stable Flies on Dairy Cows* at New Brunswick, N. J., 1953

Spray Ingriedents	Average number of flies/cow/count			
	1st day	4th day	5th day	7th day
*Repellent-Toxicant Mixture***				
8.0% Crag Fly Repellent 0.2% methoxychlor	0.5	6.5	2.5	9.0
Standard Spray				
1.2% piperonyl butoxide 0.12% pyrethrins	0.5	10.5	8.5	20.0
Untreated	33.5	26.5	40.5	27.5

*Breeds consisted of Brown Swiss, Holstein and Jersey.
**Mixture developed by Ralston Purina Company, St. Louis, Missouri.

Factors Influencing Application

REPELLENT-toxicant mixtures can be applied in several forms and by different methods; such as, ready-to-use oil base sprays; in concentrates applied from treadle sprayers, squirt guns, and pressurized containers; diluted in water and sprayed on the animals, or applied to wicks so the animal can rub against a treated sur-

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face. The type formulation or specific method of applying the protective coating to the animals is modified by the following considerations:

1. *Climatic conditions:* Temperature, humidity, rainfall and wind are the major factors in controlling breeding and activity of flies. Severe fly populations can result from optimum breeding conditions and make fly control imperative. Flies may be a major problem for only two or three months in the northeast. In southern and mid-western areas, the animals may need protection over a seven month period. Certain climatic conditions may restrict the usefulness of a given method. In windy areas, treadle or automatic sprayers may be completely ineffective. Petroleum distillate based sprays provide little protection at high temperatures.

2. *Fly species and habits:* Certain species such as stable and horse flies are more difficult to control. DDT, for example, will control horn flies on beef cattle for four to eight weeks, depending on conditions. It is not effective for stable or horse fly control. Pyrethrins will control stable or horse flies for two to three days to one week. Resting habits of the flies on the animals determine where the insecticide should be applied.

3. *Available labor:* Flies are usually at their peak annoyance period when the farmer is in his busiest season. He may not take the time, or properly supervise his help in conducting an adequate fly control program. Some farm labor may not be able to cope with the necessary chemicals and equipment. The method used should consequently be geared to the farmer's needs and his labor supply.

4. *Mammalian toxicological considerations:* The selection of chemicals is governed by their safety for use on animals. Industry is aware of its responsibility for the supply of safe formulations, and ingredients should be selected with this in mind.

5. *Animal handling procedure:* The success or practicability of a method depends on the animal handling procedures. For example, dairy cows which are handled twice daily can be sprayed easily with oil sprays or pressurized sprays. Self-treating devices such as rubbing posts (backrubbers) and treadle sprayers can be used in the pasture where non-milking or beef animals can treat themselves. To apply water based residual sprays, range animals have to be brought into an area so they can be sprayed.

The method used may be directly related to what equipment is available on the farm. Where fly control on cows or range cattle is not a major problem, specialized equipment of various types may not be available. For example, a farmer with five or six cows might not be interested nor could he justify the purchase of a treadle sprayer. A simple hand sprayer might be the only apparatus available.

Geographical aspects may limit apparatus and methods. Range animals in the south are not housed, so hand sprayers would not be feasible. Dairy cows in warm climates are sometimes kept in open sheds, making space sprays, aerosols and microsol applications less practical. Conversely, closed barns would be ideal for these methods. Combinations of these factors determine the most practical method for control.

6. *Cost:* The cost of fly control is a primary consideration to the farmer. If he is convinced that he needs to protect his animals from the attacks of biting flies in the pasture, then he is willing to invest in equipment and chemicals for control. Industry along with state and federal agencies can help show the farmer that every dollar spent in controlling flies can return two to four or even five dollars in better milk yields, increased weight of animals, and healthier livestock.

TABLE 3
Summary of Fly Control for Repellent-Toxicant Mixture With Advantages and Disadvantages

Formulation and/or method	Fly Control Species*	Time	Primary Advantages	Disadvantages
Oil spray	H,h,S	Few hrs. to 1½ days	Versatility	Protection time
Water-emul. concentrate	H,h,S,T	Few days to 2 weeks	Coverage	Labor
Pressurized spray	H,h,S,T	Few hours to 1 day	Convenience	Expense Limited use
Treadle sprayer	H,h,S,T	Few hours to 1 day	Labor saving	Installation and animal training
Backrubber	H,h,S	Few hours	Economy	Coverage, competition

*Fly species: H = horn; h = house; S = stable; T = horse or deer flies.

Sprays and Methods for Fly Control

THE methods or types of sprays employed for control of biting flies on dairy cows and range animals can be divided into the following main categories:

1. Ready to use oil sprays
2. Pressurized sprays
3. Water sprays
   a) Emulsifiable concentrates
   b) Wettable powders
4. Self-treating devices
   a) Automatic treadle sprayers
   b) Rubbing posts or backrubbers

An attempt will be made to present the advantages and disadvantages of each method as reflected by farmers, experiment station workers and formulators.

It should be pointed out that little information is currently available for commercial repellent-toxicant mixtures formulated as wettable powders. Since the bulk of wettable formulations are used on range cattle for horn fly control, we do not consider it justifiable to compare these with the other methods or types of sprays which control a broader range of fly species.

1. *Ready to use oil sprays:* Ready to use dilute oil base sprays containing a knockdown and killing agent are probably the oldest and most wide-

(*Continued on Page* 117)

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EMULSION DATA CHECK LIST

1. Toxicant used _____
2. Solvent used _____
3. For water hardness _____ ppm.
4. Recommended dilution _____
5. Lbs. toxicant/gal. of concentrate _____
6. Desired emulsion stability _____
7. Shelf life expected _____
8. Ease of dispersion important? _____
9. Packaging: bulk _____ or small container _____
10. How is concentrate mixed and evaluated in laboratory test? _____

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Pesticide Residue Tolerances

By Charles Palm
Ithaca, New York

DURING recent years many workers in industry and government concerned with pesticide tolerances as one aspect of the program for the safe use of pesticides in agricultural production felt that the Miller Bill would offer a satisfactory means for prompt and effective handling of this problem. The rapid development of synthetic organic chemicals that have proved valuable in the pest control field during the past decade needed to have official sanction with reference to tolerance levels, or exemption from requirement for tolerances, in order that we might use them intelligently in control programs recommended to growers. The hearings held in 1950 under Section 406 of the Food, Drug and Cosmetic Act, to establish the necessity for use and tolerances for pesticides needed in the production of fresh fruits and vegetables, provided a complete summary of information available up to that that time. The interval between the hearings and the establishment of tolerances on March 11, 1955, left us in a prolonged period of 'unofficial' tolerances.

When the President signed the Miller Bill on July 22, 1954, a period of one year was provided during which manufacturers or other interested parties could petition to have a tolerance established, or exemption allowed from the requirement of a tolerance, for any pesticidal chemical. With the proposal of tolerances for some twenty odd pesticides, and exemption of several chemicals from tolerance requirement published in the Federal Register on October 20, 1954, action was taken on the testimony presented in the 1950 hearings. Final tolerances and exemptions covering these proposals were issued in the Federal Register on March 11, 1955, to become effective 90 days after the printing of the regulations. These tolerances and exemptions have standing under the provisions of the Miller Bill which becomes Section 408 of the Food, Drug and Cosmetic Act.

Procedure for Petition Outlined

ACCORDING to the legislation, one who petitions for the establishment of a tolerance or exemption therefrom, for a pesticidal chemical must provide the following information in his petition:

(a) the name, chemical identity, and composition of the pesticide chemical;

(b) the amount, frequency, and time of application of the pesticide chemical;

(c) full reports of investigations made with respect to the safety of the pesticide chemical;

(d) the results of tests on the amount of residue remaining, including a description of the analytical methods used;

(e) practicable methods for removing residue which exceeds any proposed tolerance;

(f) proposed tolerances for the pesticide chemical if tolerances are proposed, and

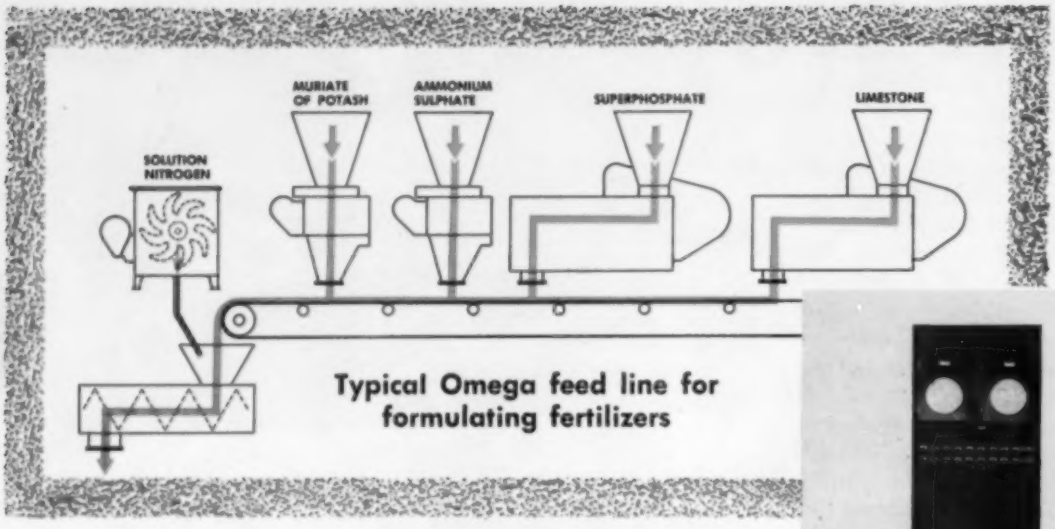
(g) reasonable grounds in support of the petition.

It is obvious that providing all of these data is not an easy matter for new chemicals, or perhaps older established ones, which for many years have had a good use pattern, but perhaps no particular organization has bothered to get all of the data currently required for the purpose of tolerance consideration.

Time An Important Factor

WITH the end of the year's period beyond the signing of the Miller Bill coming into view, all of us concerned with the use of insecticides, fungicides and herbicides are anxious to line up our recommendations to growers for pest control practices in 1955 to conform with the requirements of the new legislation. Although as indicated, tolerances for some twenty odd pesticides and exemptions of others for specific uses on fresh fruits and vegetables have been announced, there are other materials that have found their place in control programs since the 1950 hearings for which tolerances or exemptions have not as yet been published. It seems likely that in addition to those petitions already filed, others will be filed with hopes of clearance before the deadline. Provision is made in the legislation for an extension not to exceed an additional year to be granted by the Secretary of the Department of Health, Education and Welfare. To the best of our knowledge, there is no official basis for believing that an extension may be expected, hence the only practical procedure the research and extension workers can follow at present is to prepare their recommendations for the use of pesticides which conform to the requirements of the Miller Bill. Obviously, if any extension is granted, growers will be notified. Industry also faces the problem of having its labels and recommendations reviewed and in shape to meet the requirements of the new legislation by July 22, even if it should be necessary to withdraw from sales any products for which tolerances or exemptions may not be set or label registration not accepted by that time.

(*Continued on Page* 109)



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Pest Control

In South India

THE southern portion of the Indian Peninsula, jutting into the Indian Ocean and bounded on either side by the Bay of Bengal and the Arabian Sea constitutes a distinctive agricultural zone. This area, including the states of Madras, Andhra and Travancore-Cochin, is characterized by sharply contrasting topography and climate, permitting the cultivation of a wide range of crops — from tropical to mediterranian, and offering a series of unique problems in plant protection.

Until recently, the Indian Agricultural Department alone attended to pest control problems, but the picture is fast changing, and private insecticide formulators are now becoming active in the area.

Within the past ten years the synthesis of DDT and other chlorinated hydrocarbons and the wide use of these new-type insecticides has created a revolution in pest control in India, as it has every where else around the world. These insecticides became available in the open market in India in 1948-49. The state government in South India immediately organized separate plant protection services to utilize the advantages offered by these new insecticides, and the other State Governments followed sometime later.

These State Governments also initiated a system of subsidized sales of insecticides to encourage farmers to use the chemicals. The scheme was a success from its inception in 1949, when a subsidy of two-thirds of the cost price of the insecticides was granted. The subsidy was reduced to half in 1950, one quarter in 1952 and totally abolished in 1954. The institution of subsidized sales by the government helped to popularize the use of insecticides widely, but served to delay the organization of servicing and advisory bodies by private agencies. This latter phase of development is now getting under way.

Major Crop Pests and Their Control

Pests of the rice crop are of critical concern in South India where rice represents the area's staple food.

The army-worm (*Spodoptera mauritia*, Boisd) and thrips (*thrips oryzae*, Wp.) are fairly wide-spread on nursery crops, doing considerable damage. Transplanted crops are attacked by stem borer (*Schoenobius bipunctifer*, Wlk), case-worm (*Nymphula depunctalis*, Guen.), green Jassids (*Nephotettix bipunctatus*, Fab), mealy bug (*Ripersia oryzae*, Gr.), and other insects which may develop as serious pests in different localities. At a later stage, when the ear-heads are produced, ear-head bug (*Leptocorissa acuta*, Th.) and grasshoppers (*Hieroglyphus banian* Fab. and *Oxya velox*, Fab) cause severe damage. It was found that most of the insects attacking rice, excepting the green jassids, could be fairly well controlled by the use of BHC dusts and sprays. Green jassids, which are resistant to BHC are effectively controlled with DDT dusts or sprays. When a number of pests occur together, as is often the case, a mixture of BHC and DDT or toxaphene is usually used. Results with parathion emulsions, tried against green jassids and stem borers, were inconclusive. Experiments are now in progress using endrin against the stem borer pest.

Bharat Pulverizing Mills Ltd.,
Pest Control Division.

Sorghums, also important as a food crop, are endangered by various pests such as the ear-head bug (*Calocoris angustatus*, Leth.). Dusts of BHC are widely used in all areas for control.

Heavy infestations of jassids (*Empoasca devastens*, D.), plant lice (*Aphis gossipii* Gl.) and the spiny boll-worm (*Earias insulana* Boisd and *E. fabia*, Stoll.) have become a serious problem affecting the cotton acreage. Mixed formulations containing BHC, DDT and sulfur, or toxaphene and sulfur have been used with success against most cotton insects, except the spiny bollworm. The latter insect was resistant to all insecticides, but experiments carried out during the 1953 season have shown that fair control of this pest can be effected by using sprays of endrin. Mealy bugs (*Pseudococcus* sp.) also caused severe damage in certain areas. Sprays with parathion were effective. Bharat Pulverizing Mills Ltd. has now introduced malathion, which with its lower mammalian toxicity, is more suitable under the prevailing conditions.

Peanuts, [(*Arachis hypogea*)], a rain-fed crop cultivated in dry lands,

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are important to this area also. Insecticidal treatments requiring water-based sprays present a problem in such tracts on any large scale. The crop is subject to heavy infestations of an Arctiad caterpillar (*Amsacta albistriga*, Wlk), a voracious and polyphagous feeder, defoliating practically all the green vegetation at the sites of infestation. Results of work done during the past three years have shown that BHC and toxaphene dusts and sprays were toxic to the caterpillars up to the second moult. In 1954, experiments conducted with endrin emulsion gave complete mortality of caterpillars up to the fourth instar at 0.75 lbs. of endrin per acre. But limitation of water supply in peanut growing areas, reduced the utility of such a finding. The possibility of using endrin dusts, reported to have been perfected recently, has yet to be investigated.

Chillis (*Capsicum* sp.) occupying a very considerable area in South India are severly affected by a variety of thrips (*Scirtothrips dorsalis*, Hd.) from the nursery onward. Prior to the introduction of chlorinated hydrocarbons, nicotine sprays and dusts gave some control, but the short residual effect of this material necessitated frequent applications, making the treatment an uneconomical one. With the introduction of BHC, treatments with either dusts or sprays commenced from the nurseries and were repeated at regular intervals during the entire duration of the crop, about 6 to 8 times. During the past two seasons (1953-54) there were indications that BHC was losing its original potency against thrips, evidently due to resistance being built up by the insects.

The important fruit crops of South India are mangoes and citrus varieties. Mango crops are attacked, usually at the flowering period by three species of jassid hoppers (*Idiocerus* sp.) which cause complete destruction of the flowers. The introduction of DDT effectively controlled these hoppers and now orchardists invariably spray their trees at bud-burst, whether hopper infestation is imminent or not. The constant use of DDT sprays during the past 7 years has resulted in the development of highly resistant strains of hoppers and also induced very serious and heavy build-up of mealy bugs.

The cultivation of mandarin oranges is confined to the hills of the Western Ghats where plantations are found at elevations of 2,000 to 4,000 feet above sea level in localities exposed to heavy monsoon rains. In certain areas of the hills, mandarin plantations have been almost wiped out due to infestation by two Cerambyeid Beetles, (*Chelidonium cinctum* Gr. and *Chloridolum alcmene*, Thoms). Detailed investigations failed to indicate any satisfactory chemical method of control and orchardists have been advised to remove infected twigs and branches immediately after the flight seasons of the beetles. Scales also occur, but the damage, except in rare instances, has not been acute enough to warrant the adoption of organized control measures.

Orchards of sweet lime varieties of citrus occupy appreciable areas in the plains, particularly in tracts of red soil with low rainfall. All these plantations indicate heavy infestation by mites (*Tetranychus* sp.) but as yet, no serious concerted measures have been taken for their control. Another insect pest of importance on this crop is the fruit sucking moth (*Ophideres* sp.) which attacks fruits nearing maturity. It has not been possible to devise any means of control against these insects. Other insects like citrus aphids, aleyurodids and leaf-eating caterpillars, develop occasionally as localized pests and are treated effectively by spraying with BHC, parathion, arsenates etc.

South India is justly famous for its extensive tea, coffee, rubber, cardamom and black pepper plantations located in the hilly regions of the Western Ghats. The tea crop is comparatively free from serious insect infestations excepting in a few areas where the tea-mosquito (*Helopeltis theivora* Wlk) is prevalent. Dusting 5% DDT or spraying wettable DDT has given effective control of this pest.

The most important insect pest of coffee is the Green Scale (*Lecanium viride*, Gr.) an introduced pest. Inroads made by this insect have assumed alarming proportions during the last few years mainly due to drought and constant use of copper sprays to control coffee diseases. The insect is usually controlled by a fungus requiring heavy rainfall for its proper development. The effectiveness of this fungus has been further depressed because of the use of copper sprays, which were necessary in the control program against coffee diseases. Investigations on control measures conducted by the research staff of the Coffee Board and other agencies have now shown that the most economical method is to spray with TEPP or HETP. The possibility of replacing this material with malathion is being investigated. A stem-borer of coffee, a cerambyeid beetle (*Xylotrechus quadripes*, chev.) originally confined to limited areas, has slowly extended itself and is now present in all tracts. A spray with BHC wettable powder on the stems just prior to the flight season of the beetle was found to give satisfactory control. With the introduction of dieldrin, emulsion sprays of this product are reported to give better results.

Cardamom was a profitable crop until about 20 years ago, when thrips (*Thrips cardamomi*, Ram.) were reported to be infesting the pods. This insect has now spread throughout all cardamom plantations in South India and causes an annual loss of from 50 to 75% of the crop. After trials with various insecticides both as dusts and sprays, it was found that periodical applications of BHC, 5% dust, 5-8 in a season, gave comparatively good control and this is being adopted now in practically all plantations. However, there is considerable scope for further research on this problem as the results obtained with BHC are not considered to be commercially satisfactory.

Biological Control

IN southern India, where most of the crops and their pests are indigenous, the scope for biological control is limited. A trial to control an indigenous pest (*Nephantis serinopa*,

(*Continued on Page* 123)

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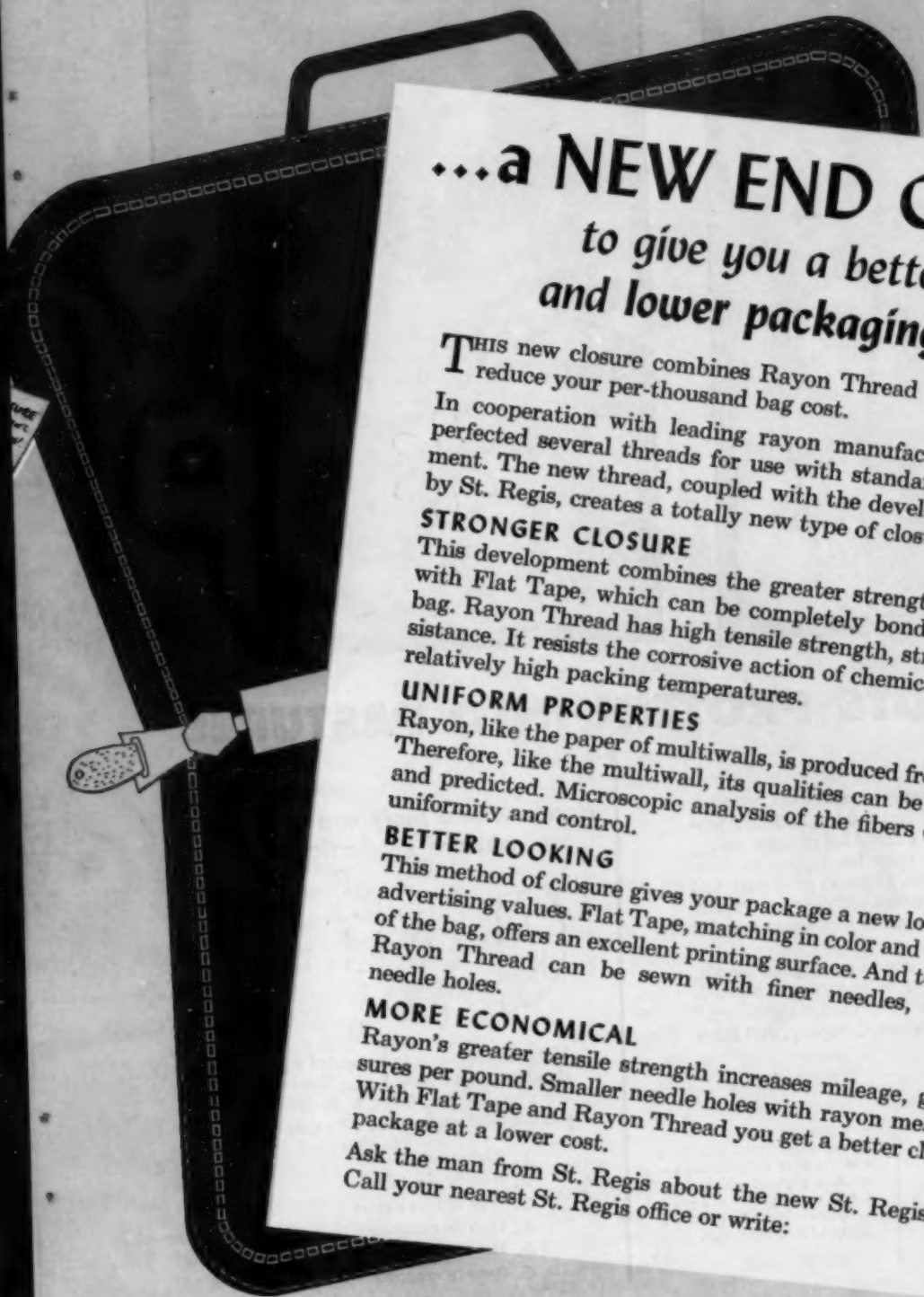

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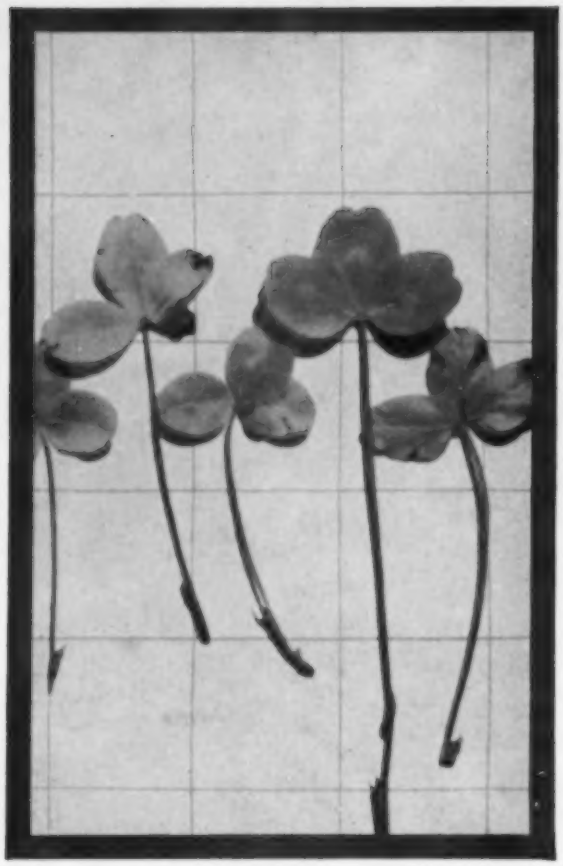

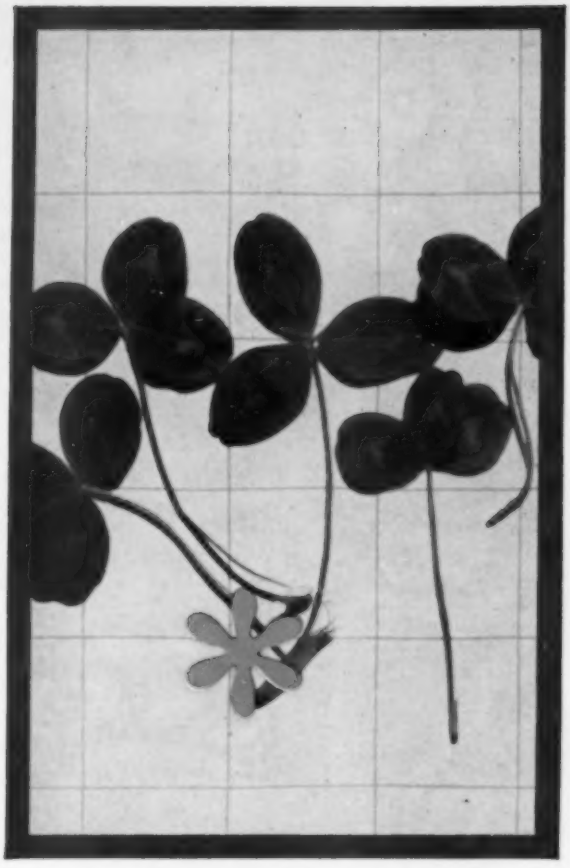

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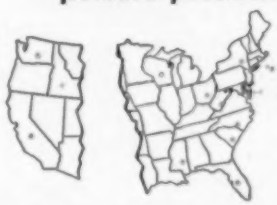
This advertisement is printed in one shade of molybdenum orange, a pigment widely used for its striking color and good coverage — ideal in paint for farm and field equipment.

Here's where moly can improve pasture production



States already reporting moly deficient soils (E. R. Purvis, *Ag. Chemicals* 11/54)

+ = Deficiency suspected

Moly is most likely to be needed east of the Great Plains, in the Pacific Northwest, and along the Gulf Coast. Moly deficiencies are most common on soils that are:

1. Highly acid
2. Heavily leached
3. High in iron oxides
4. High in manganese
5. Heavily dressed with sulfates
6. Heavily cropped

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LISTENING *Post*

Factors Influencing the Control of Peach Scab in S. Carolina

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

DONALD H. PETERSEN and John C. Dunegan, report cooperative experiments of the U. S. Agricultural Research Service, and Clemson Agricultural College of South Carolina, on the control of peach scab (*Cladosporium carpophilum*).

It has long been known that very few infections occur on the fruit until 4 to 6 weeks after petal fall. This fact emphasizes the importance of an application of a suitable fungicide about one month after petal fall.

It had been shown earlier that scab could be controlled by spraying with self-boiled lime-sulfur, 16-16-100, or with wettable sulfur, 10 pounds in 100 gallons. If scab were the only problem, for maximum control a second spray should be applied 2 or 3 weeks later. However, the need in most orchards for protection against brown rot (*Monilinia fructicola*) makes it desirable to delay this second scab spray until 3 or 4 weeks before harvest. Varieties maturing later than Elberta need the spray applied 1 month after petal fall, plus a second spray applied 2 or 3 weeks later and a third spray 1 month after the second scab spray.

These control procedures have been known for many years. However, since 1951 peach growers in the southeastern fruit sections have reported each year a marked upsurge in the prevalence of peach scab on the fruit. It has been suggested that this increase might be due to the following:

(1) Absence of lime in the current spray formulations as the result of the use of organic insecticides.

(2) Reduction in the amount of fungicide used per application even though a larger total of fungicide is applied per season.

(3) Mechanical methods of applying sprays rather than the manual spraying formerly used.

(4) Possible development of a new strain of the scab fungus, *Cladosporium carpophilum*.

(5) Increased susceptibility of the new peach varieties.

Field observations and spraying experiments in South Carolina during 1953 did not furnish conclusive evidence that any single factor was responsible for the increase in the prevalence of peach scab. Accordingly, detailed plans were devised to investigate further in the 1954 experiments several of the factors involved.

The experimental program, involving 31 different treatments in 1954, was carried out in a block of 6-year-old Southland peach trees at Trenton, S. C. Single-tree plots, replicated 5 times, were sprayed manually with a hydraulic sprayer operating at 500 pounds per square inch at the pump. The trees were sprayed March 22 (petal fall), April 6 (shuck-split), April 15 (second cover), and April 26 ((third cover). Preharvest sprays were applied May 18 and June 1. All the trees (even those where the effect of lead arsenate was being tried) were treated with 1.5% parathion dust for the control of insects.

At harvest, 100 peaches were picked at random from each replicate tree and the number showing scab spots was recorded.

Effect of Time and Number of Sulfur Sprays on Control of Peach Scab: In this phase of the experiment, sulfur was used at the rate of 6 pounds per 100 gallons of water. The schedule of applications is shown diagramatically in Table 1, together with the amount of scab observed on the fruit examined at harvest time, and the results of a statistical analysis of these data. Under the procedure used (i.e., transformation of the percentage figures to equivalent angles) differences in significance must be measured from the means of equivalent angles and not from the arithmetical means.

The data in Table 1 show that a full-season schedule of six sulfur sprays (Plot 18) gave excellent control of scab. However, the omission of the second cover spray (Plot 14), or of the first two and the last applications (Plot 10), gave results that were practically as good. The data show also that the spray applied April 26, 5 weeks after petal fall, had a marked effect upon the development of scab infections even when, as in Plot 5, this spray was the only one applied throughout the season. The higher incidence of scab infections in Plots 8, 9, and 15, where the April 26 spray was omitted, further emphasizes the importance of a spray applied during the period 4 to 6 weeks after petal fall.

The group of single-spray applications (Plots 2 to 7) are of considerable interest. The result obtained in Plot 5 has been mentioned, but it is evident that single applications on March 22, April 6, and April 15 (Plots 2, 3 and 4) respectively, were of little value in the control of scab whereas the preharvest sprays (plots 6 and 7) did have a slight depressing effect upon the development of scab infections. It should not be inferred that any of these single-spray treatments are considered to give satisfactory commercial control.

The scab control obtained with the various combinations used in Plots 11, 12, 13, 16 and 17 is only slightly inferior to the control obtained in Plot 10. The results obtained in Plots 11, 12 and 13, where one or both of the early sprays were omitted, are as good as those obtained in Plots 16 and 17, where both early sprays were used, indicating that the early sprays have little effect upon peach scab control.

Effect on Scab Control of Various Chemicals Applied Only During the Scab Infection Period:

The experiments just described involved the application of only sulfur at varied times. The next group of experiments tested the effectiveness of lime, lime and lead arsenate, lime and zinc sulfate, and lime, lead arsenate and zinc sulfate, applied only during the scab infection period It was not feasible to have a treatment of only lead arsenate or zinc sulfate because of the drastic injury that would result. The results obtained with sulfur applied at the same time are included in Table 2 for comparison.

Data for tables 1 to 5 are given on pages 111 to 112

The data in Table 2 show that as compared with sulfur the other materials are not effective. The lack of control with lime alone (Plot 23) is particularly striking. The effect of the addition of lead arsenate to the lime (Plot 24) suggests, as has been maintained previously, that lead arsenate exerts some fungicidal action.

Effect of Materials added to Sulfur Sprays on Scab Control:

In this group of treatments a full season schedule (6 sprays) of sulfur was supplemented by certain applications of lime, of lime and lead arsenate, or of these two materials combined with zinc sulfate.

The results in Table 3 show that scab control was not markedly different in Plots 19, 20 and 21 from that obtained with the sulfur alone.

Plot 22, however, presents a different picture. Here the addition of zinc sulfate seemingly resulted in less satisfactory control. Direct comparison with the other treatments is not possible because the times the treatments were applied were not identical.

Effect of Increased Dosages of Sulfur on Peach Scab Control When The Critical (4 to 6 Weeks After Petal Fall) Spray is Omitted:

The results that have been presented indicate the importance of the sulfur spray applied during the critical 4 to 6 weeks after petal fall period. In commercial practice, however, circumstances may arise (machinery breakdown or adverse weather conditions, for example)

((Continued on Page 110)

Boll Weevils, Forage Pests, Tobacco Pests Active

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

COUNTS of boll weevils surviving the winter have been completed in Louisiana, South Carolina, North Carolina and Virginia. Average survival counts in Madison Parish, Louisiana, were 2,021 live weevils per acre. This is about 2½ times the average found in this Parish during the past 19 years. On a percentage basis, this count is 75 per cent of the number found in the 1954 fall hibernation survey and in the 19 years during which records have been kept is exceeded only by 1953, 1949 and 1941. In other Louisiana Parishes the survival percentages were as follows: Ouachita 11; St. Landry 29; Avoyelles 18; Red River 100; and Bossier 86. Previous years figures are not available for the latter Parishes. Ground trash from five farms in each of nine counties in North Carolina was checked for surviving boll weevils. The average number of live weevils found per acre was 236. This gave a percentage survival rate of 17.6 of the 1,334 weevils found in fall hibernation counts. Although no previous fall counts for North Carolina are available, spring counts in 1954 were 1,820 surviving weevils per acre and 3,920 in 1953. Boll weevil survival counts were very low in southeastern Virginia, with the average being 73 per acre. The average survival was 3.5 per cent of the 2,033 found in the 1954 fall hibernation counts. The Florence County, S. C., survival figures as reported in this column last month were 2,178 live weevils per acre as compared with the average of 2,887 for the past 18 years, but the percentage survival was 94.7, exceeded only in 1949, 1950 and 1953. Although no previous figures are available for Washington County, Miss., spring counts of trash samples show 1,646 live weevils per acre. This compares favorably with the counts from Madison Parish, La. The first insect activity in cotton fields has been reported from the Lower Rio Grande

Valley of Texas, where damaging numbers of thrips were found in fields adjacent to onions. Spider mites in damaging numbers were present in a few fields prior to the cold weather in late March. Bollworms were found feeding in the terminal buds of seedling plants, and cutworms were present in all areas, particularly where cotton followed leafy vegetables. Bollworms were active also in flax in Refugio County, Texas. Larvae were feeding on the green pods and at one location near Bayside the count was at the rate of 15,895 per acre.

Cereal and Forage Pests

BY the latter part of March heavy infestations of greenbugs were developing on irrigated wheat in the Panhandle area of Texas. Light local infestations on small grains were reported widely distributed in the north central Texas area north of Dallas and Fort Worth. A severe infestation of greenbugs on about 75 acres of barley in Tensas Parish, Louisiana, was reported as being heavily parasitized by a parasitic wasp. This parasite was also reported from the north central Texas area.

Activity was also reported locally from Arkansas, Mississippi and Florida. Below economic numbers were reported from Marana, Ariz., and surveys in Kansas show only a few specimens, but still of noneconomic importance. By the latter part of March and early April, the alfalfa weevil was becoming rather active in some of the eastern states. The weevil was active throughout Delaware and in northern Virginia counties. Larvae were reported active in both Maryland and Pennsylvania. Adult weevils were active in western Nevada during late March, egg laying was under way and limited adult control was practiced in most of the valleys.

Hatching of the meadow spittlebug was under way in Delaware, Pennsylvania and Maryland.

The pea aphid by early April was rapidly becoming one of the more important legume pests in the eastern states. The increase on alfalfa in Virginia was very rapid throughout the state as well as the Maryland eastern shore.

Insect Pests Active in Tobacco Plant Beds

MIDGES were among the outstanding tobacco plant bed pests in North Carolina during late March and early April. In local instances these insects sometimes were responsible for destruction of most of the young plants. Light to moderate infestations were reported from Forsyth, Johnston, Sampson, Yadkin and Onslow Counties. The vegetable weevil was also an important pest in tobacco plant beds. Nearly all beds in southern Georgia were showing some damage in mid-March, while several beds at Florence, S. C., had severe damage in early April. Moderate infestations of plant beds were reported from Sampson County, N. C. Other pests of importance in tobacco plant beds in the southern states include flea beetles in Virginia, North Carolina and Tennessee; and crane flies, cutworms, aphids and white grubs in North Carolina.

1954 European Corn Borer Loss

THE estimated loss to field corn in 1954 from the European corn borer has been announced. The figures are compiled from reports supplied by cooperating state agencies in the States concerned. The loss was estimated at about 261 million dollars or about 191 million bushels of corn. This compares with a loss of about 125 million dollars in 1953 and 77 million dollars in 1952.

Fruits in Southeast Damaged by Freeze

THE late March freeze had a decided impact on the fruit potentials in the area from southern Illinois and Indiana to the States south and east. In this area, a large percentage of the potential peach crop was destroyed, the apple crop also suffered severe damage in certain areas. Some sections report it is doubtful if additional spraying on these crops will be made this year. Fruit insects, however, should still be watched and where feasible controlled.

Prior to the freeze, overwintering codling moth larvae were more plentiful at Vincennes, Ind., than since 1944, and up to that time also the weather had been favorable for survival of this pest in Virginia. Although reports on the effect of the low temperature on the insect in these areas are not yet available, the larvae survived the freeze in the apple area of North Carolina. Eggs of apple aphid, the European red mite and pupae of of oriental fruit moth also withstood the cold in the latter state. Rosy apple aphid was present in large enough numbers in Lawrence and Orange Counties, Indiana, the second week of April to cause damage to the remaining apple crop in that area.

Potato Psyllid Survey

A SURVEY conducted in late March to determine the potato psyllid populations on wild host plants in the southwestern states showed above normal numbers present. It is from this area that this pest, which causes psyllid yellows, moves into the potato and tomato growing areas of Colorado, Utah, Wyoming, Nebraska, and Montana. Populations in central Arizona, from where it is believed the eastern Utah and western Colorado infestations originate, averaged 225 psyllids per 100 sweeps. Southern California counts averaged 13 per 100 sweeps and it is thought the northern Utah infestations originate in this area. The infestations east of the Rockies are believed to originate in southwestern Texas and southern New Mexico. Counts this year were 22 per 100 sweeps or about half of the 1954 count. However, epidemic numbers occurred in eastern Colorado, eastern Wyoming and western Nebraska in 1949 following a spring population of 18, in the Texas-New Mexico area in 1950 following a population of 19, and in 1953 following a population of 29. Weather, of course, is a deciding factor, slightly above nomal temperatures in May and above normal temperature in June in the northern States are favorable for psyllid movement.★★

Technical SECTION

West Texans See Chemicals Meeting Challenge of Agriculture

AVAILABILITY of fertilizer phosphorus to plants early in the growing period is very important and is directly related to the solubility in water of the phosphate compound applied. Arthur M. Smith, Olin-Mathieson Chemical Corp., in his talk before the Second Annual Agricultural Chemical Conference at Lubbock, Texas recently, listed other conclusions from a study on phosphorus as:

(a) Phosphates of mono-valent bases are more soluble and diffuse more in most soils than those of di-valent bases.

(b) Mono-ammonium phosphate is more soluble and diffuses to a greater extent in soils than mono-calcium phosphate.

(c) Mono-ammonium phosphate supplies phosphorus that is more available to plants than that from either mono-calcium phosphate or di-calcium phosphate as supplied in superphosphate and fertilizers made with superphosphate.

Most mineral soils, except those of a sandy nature, are high in total potassium, but the potash held in an easily exchangeable condition at the mineral interfaces is usually small. Higher plants must depend, in part, on the ordinary processes of solution, or effect an availability by direct contact with the undecomposed soil minerals and the colloidal complex. Some very fertile Red River soils in Louisiana give good responses to the application of potash even though the soils are high in potash.

N. D. Morgan, in his resume of potassium availability, added that the element is of great importance in relation to cell wall formation and stiffness of stems. Directly or indirectly, it is believed that potassium is essential for reduction of nitrate and perhaps for later stages of protein synthesis. Conclusions were:

(a) Potassium is a major plant-food nutrient necesary for production of carbohydrates, and plays an essential role in the absorption of anions, such as nitrates.

(b) It is essential for reduction of nitrates, favors protein manufacture, has a balancing effect on excessive amounts of nitrogen and phosphorus and gives plump, heavy kernels in grain.

(c) Potassium encourages root development, is necessary for tuber development, increases resistance to disease, improves plant vigor, is necessary for the development of chlorophyll and tends to prevent prematurity.

Systemic and Phos. Insecticides

Many compounds are in the experimental stage, but the only two really systemic insecticides commercially available now are phosphorous compounds, schradan and demeton. Schradan (octamethyl pyrophosphoramide) acts like all systemic phosphorus insecticides by inhibiting the enzyme cholineserase. Schradan content of cotton seed from treated plants is quite low (1 part or less per million) and even this amount is completely removed from the oil by refining, said E. E. Ivy, U. S. D. A.

Demeton is now being recommended for use on potatoes, allowing a five week lapse between treatment and market. Demeton is said to have two to three times the systemic activity of schradan.

Methyl parathion is reported to be more effective against boll weevils than parathion but has less residual toxicity. Good results with methyl parathion have been experienced in the tropical areas of Mexico and Central America, where rainfall occurs every afternoon and no compound gives residual protection. What is most needed in these areas is a quick-acting insecticide.

A new phosphorus compound that shows promise is a benzotriazine derivative of a dithiophosphoric acid, methyl ester, called Bayer's Compound 17147. It is effective against pink bollworm and has long residual toxicity. It also controls boll weevils, cotton leafworms, thrips, spider mites and other cotton pests.

Weed Control

No hormone-type weed killers can be used safely for weed control in wheat or sorghum that is growing near cotton; however, last year a new chemical called Silvex or Kuron (2,2,4,5 -trichlorophenoxy propionic acid) has become available which is less toxic to cotton than either 2,4-D or 2,4,5-T. Its effectiveness on weeds in wheat and sorghum is not known yet.★★

•

Find Answer to Pear Disease

In Washington State, research plant pathologists have come up with a cheap cure for blossom blast and twig dieback—a pear tree disease that has troubled growers, for 25 years.

Once they had found the cause of the disease—boron deficiency—they weren't long in developing an effective control: a fall foliage spray of borax or "Polybor."

Suitable sprays contain 3 pounds of borax or 2 pounds of Polybor in 100 gallons of water. Fall sprays—after harvest—give best results. Both soil treatments and early summer sprays gave erratic control.

Bartlett, Anjou and Bosc varieties of pears are susceptible to blossom blast and twig dieback. When infection is severe, blossoms shrivel and die, and the young leaves forming on new season's growth fall off. Entire branches may dieback.

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New Liquid Grain Protectant

A liquid grain protectant has been developed to arm the wheat farmer against grain infestation, according to Donald A. Wilbur, professor of entomology at Kansas State College. Developed after five years' research, the protectant may supply the answer to the grain infestation problem at the farm level. This protectant is applied in the form of a wet spray, and is designed to kill or repel grain storage insects.

Dr. Wilbur evaluates the protectant as particularly effective against the cadelle beetle, the saw-tooth grain beetle, flat grain beetle and some of the other grain insects that annually destroy millions of bushels of wheat. He bases his conclusions on the performance of the product in a comprehensive test program conducted on wheat farms in Harvey County, Kansas, which was initiated in 1952. In the final stage last year the program embraced eighty-three bins on some thirty farms, the bins averaging about 800 bushels each.

Wilbur said the best results were obtained by applying the spray at the rate of two gallons to each thousand bushels of wheat. This will cost the farmer about 2½ cents to the bushel.

The compound will be marketed as "Tetrakate" by Douglas Chemical Co., Kansas City, Mo.

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Mercury Compounds Hurt Roses

Rose injury has been caused by treating soil in a greenhouse with mercuric chloride solution. Injury was also noted from metallic vapors. Paint containing an organic mercury compound as a fungicide has also caused some rose damage. "Roses Affected by Mercury Compounds in Greenhouse Paint," Norman W. Butterfield, *Florists Exchange, Horticultural Trade World*, 123, 14 (1954); through *Chemical Abstracts*, Vol. 49, No. 1, page 555.

•

Boron Activity in Soils

Fixation of boron is related to the total soil content of the element. Boron, added to four soils as borax, is not easily removed by leaching with 0.01 N calcium chloride solution. From 13 to 20m. of rainfall were necessary to remove 32,65,58 and 46 per cent of applied boron. Alternate wetting and drying favored release of boron from the soils, and over a period of time, accumulation of small amounts of boron in the soil influenced soil fertility. "Activity of the Boron Ions Retained in the Soil," Georges Barbier and Jean Chabannes, *Compt. Rend.* 239, 89-91 (1954), through *Chemical Abstracts*, Vol. 49, No. 1, page 548.

•

Particle Size Aerosols

A revision of "Directions for Determining Particle Size of Aerosols and Fine Sprays," ET-267, issued by the former Bureau of Entomology and Plant Quarantine in May 1949, has been released by U.S.D.A.

A sample of liquefied-gas aerosol is deposited on a glass slide and particles measured under a high-power microscope. The temperature of the formulation and dispenser has been changed to 80 degrees to compare aerosol formulas.

Wheat Rust Control

Although no commercial fungicides are available to control wheat rust in large fields, small plots of seed or breeding wheat may be protected with chemicals, according to W. C. Haskett, USDA plant pathologist at Kansas State College, Manhattan.

"Tests have shown that wheat is best protected from rust by several timed applications of sulfur dust and zinc or manganese carbamate fungicides," Haskett states. While similar protection could be given to large fields by means of airplane spraying, the rate and number of applications required to give control would not be economically practical in Kansas.

"Stem rust is not a major factor most years in Kansas. However, in a wet season, the disease may cause heavy losses," Haskett declared. Calcium sulfamite, the commercial weed killer, also is effective in controlling wheat rust, but is not recommended because it produces severe burning of plants, shriveled grain, poor germination, and injures the milling and baking qualities of the grain.

Malathion Spray For Fruit and Melon Fly

A bait spray containing malathion that protects growing mangoes, guavas, and passion fruit from attack by the oriental fruit fly and the melon fly is now being recommended to Hawaiian growers by the U. S. Department of Agriculture

Compared to conventional insecticide sprays, this bait spray contains a protein substance, attractive to the fruit flies, that lures them into feeding on the toxic chemical. Another advantage of the bait spray is that complete spray coverage of all orchard foliage is not necessary. Good distribution of bait spray throughout the orchard, and on surrounding plantings will attract flies to their death without attracting their parasites and other natural enemies.

Entomologists of the Department's Agricultural Research Service, who developed the bait spray, say one foliage spraying provides control from 1 to 3 weeks. How long sprays remain effective, depends on the weather. During dry weather, the bait spray affords protection for 3 or more weeks; wet weather reduces its effective life to 10 days or a week.

Thus far, entomologists are recommending the bait spray for control of these two destructive insects only on guavas, mangoes, and passion fruit. However, limited tests have shown the bait spray to be effective against the Mediterranean fruit fly. Studies are underway to determine if malathion has any toxic effect on other tropical and subtropical crops that are attacked by the fruit flies.

Growers can mix their own bait spray of water, 25 per cent wettable powder malathion, and a hydrolyzed yeast protein. It can be applied as a concentrated spray with a mist blower or as a dilute spray with conventional spray equipment.

Details on how to mix and apply the bait spray are included in ARS-33, a publication of USDA. Single copies can be obtained free from the Agricultural Research Service, U. S. Dept. of Agriculture.

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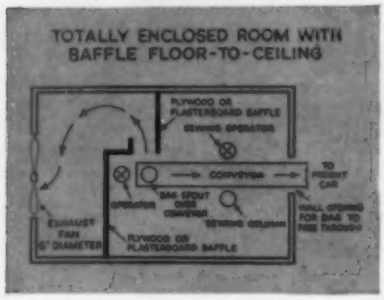

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Soil Insecticides Aid Mid-South

Aldrin, toxaphene, or heptachlor at 2, 25 and 2 pounds per acre, respectively, applied to the soil surface or mixed with the soil, effectively control southern corn rootworms. Aldrin and toxaphene also gave excellent control of tobacco thrips in the soil, reports the U.S.D.A., Beltsville, Md. Dusts of aldrin and toxaphene at 1.75 pounds per acre, were very effective against the clover root borer.

Parathion, at 0.75-1.0 pound per acre soil, destroyed the green June beetle. DDT, mixed with the upper soil at the rate of 10-15 pounds per acre, gave good control of newly hatched larvae of the white fringed beetle for as long as seven years after application. Red harvester ants were destroyed with a dieldrin or chlordane dust placed on the soil near nests, or with carbon disulphide or methyl bromide fumigation. F. W. Poos, *Southern Seedsman*, Vol. 17, No. 2, 1954.

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Europeans Discuss Orthocide

Reports on world-wide research and development work with the California Spray Chemical Co.'s fungicide, "Orthocide," featured a three-day meeting recently held at the Congress Hotel in Zurich, Switzerland. Sponsored by California Spray-Chemical Compagnie Francaise, this second annual European Orthocide Meeting was attended by forty-four delegates from European industry.

Evidence in favor of the use of Orthocide on grape vines was very strong and it will undoubtedly be used quite widely on this crop in Europe in 1955.

A delegate from Holland reported that Orthocide has been used on a pear variety—St. Remy—which is heavily affected by scab at harvest time. Although spraying had stopped in mid-August, these were the results:

Untreated	100% Scab
Ziram	73%
Lime Sulfur	78%
Wett. Sulfur	89%
Orthocide	22%

On Golden Delicious apples, where the last Orthocide application was made in mid-August, while a late Scab-infection appeared in early September, the actual percentages at harvest were:

Untreated	100% Scab
Lime Sulfur	98%
TMTD	54%
Orthocide	5%

The application rate was 0.25% pre-blossom and petal fall, and 0.2% during summer. Norway reported enthusiastically on outstanding results against botrytis on strawberries, and this was also confirmed by delegates from France, Sweden, Denmark and England.

Switzerland reported on the outstanding cherry crop after Orthocide treatment and all delegates commented most favorably on the improved storageability of Orthocide-treated fruit.

•

Marlate Stops Cattle Flies

A quick, easy method for controlling hornflies on dairy cattle has proved successful in U.S. Department of Agriculture tests. A tablespoonful of 50 per cent methoxychlor insecticide is sprinkled along the back of the animal and then rubbed into the hair with a few sweeps of the hand. Powder should be spread evenly over back, neck, and upper sides. Two to three weeks' control of hornflies has been reported. One four-pound bag of "Marlate" 50 methoxychlor insecticide applied at two-week intervals controls flies on 20 milk cows for 10 weeks.- Product Information Service, E. I. du Pont de Nemours & Co., Feb., 1955.

•

"Ammate" Kills Wild Plum

South Carolina experiment station entomologists have declared that all wild plum bushes growing within 300 yards of peach orchards should be destroyed. A survey showed that 40 to 50 per cent of the wild plums in the state are infected with phony peach disease, a virus infection attacking commercial peach orchards. A spray of one pound of "Ammate" weed and brush killer dissolved in a gallon of water and applied when trees are in full leaf is reported to kill the trees. *Agricultural News Letter*, Vol. 22, No. 6, (E. I. du Pont de Nemours & Co., Inc.)

DDT and BHC Tasted in Grapes

Vineyards treated four times during the vegetative period with a 12 per cent dust of BHC, 7 per cent DDT, or with a 40 per cent mineral-oil emulsion containing 20 per cent each of BHC and DDT, produced grapes of usual size, experiencing normal development; however, the grapes obtained, with the exception of those coming from the emulsion-treated plants, possessed an unpleasant taste and could not be marketed. K. S. Ruzaev, *Vinodellie i Vinogradarstvo S.S.S.R.*, 11, No. 9, P. 44-45, 1951; (through Chemical Abstracts, Vol. 49, No. 3, Feb. 10, 1955.

•

2,4-D Controls Fruit Splitting

Recent reports from Riverside California indicate that 2,4-D controls the problem of oranges splitting while still on the tree. Drs. W. S. Stewart and L. C. Erickson, University of California, caution growers against excessive quantities since too heavy an application of 2,4-D can harm fruit quality and possibly harm leaves. Although 2,4-D does not harm the internal quality of the orange, excessive applications can affect the appearance of the skin, they report.

Further details concerning the use of 2,4-D on citrus are available from Dept. AC, Citrus Experiment Station, Riverside, Calif.

•

New Insecticide-Fungicide

An effective combination of dieldrin insecticide and "Arasan" seed disinfectant has been developed by the Du Pont Company for the treatment of beans (including limas), seed corn (field and sweet), and pea seed.

The new material is being marketed under the trademark "Delsan" AD seed protectant. It combines protection by "Arasan" against such soil-born organisms as seed decay and seedling blight with control of soil insects such as seed-corn maggot, provided by the dieldrin. However, where heavy infestations of such soil insects as wire worms exist, the material should be fortified, like any other insecticide seed treatment, by broadcasting a suitable insecticide over the soil before planting. *Agricultural News Letter* 23, No. 2, 25, 1955.

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Insecticide Treatments: Alfalfa

Alfalfa, treated with dieldrin at the rates of one and four ounces per acre, cut seven days later and stored for about four months, was fed to lactating cows for four 28-day periods. No detectable effect on the production, feed consumption or health of the cows was noted.

Preliminary data shows that at both levels of treatment, there is an excretion of dieldrin in the milk. Heptachlor applied to alfalfa was not transmitted to the milk of cows fed the harvested hay treated with four ounces of heptachlor per acre. The epoxide also appeared in the fatty tissue and in butter from cows fed hay treated with four ounces per acre. Histological examination of kidney, liver muscle, and fat tissue did not show any abnormal effects associated with either of the two insecticides and insect control was 98-100 per cent effective. G. E. Stoddard, G. Q. Bateman, J. L. Schupe, J. R. Harris, T. H. Bahler, L. E. Harris, and D. A. Greenwood, *Proceedings of the Annual Meeting, Western Division, American Dairy Science Association*, 35, p. 295-300, 1954; (through Chemical abstracts, Vol. 49, No. 3, Feb. 10, 1955).

•

Fusarex Retards Sprouting

Laboratory experiments at the Imperial College of Science and Technology, London, have shown that potato tubers dusted with Fusarex (preparation containing three per cent tetrachlornitrobenzene) exhibit reduced sprouting. The lower the temperature and the earlier the application of the dust, the greater the reduction.

Repressive effect of Fusarex was neutralized to an extent because of treatment of the tubers with ethylene chlorohydrin. The average number of shoots per plant was increased by treatment with Fusarex, and one application was sufficient to repress sprouting over the winter storage period. W. Brown and Mary J. Reavill, *Annals of Applied Biology*, Vol. 41, p. 435-447, 1954; (through Chemical Abstracts, Vol. 49, No. 2, Jan. 25, 1955.)

Literature Available

The following list reviews a series of bulletins on fertilizer, insecticide and fungicide recommendations, controls, etc. For the most part, these bulletins and reports are prepared by the various state agricultural experiment stations, and copies may be obtained by writing directly to the respective stations.

SUMMARY OF LEGISLATIVE POLICIES AND PROGRAMS OF THE NATIONAL GRANGE FOR 1955. The pamphlet is based on the resolutions passed by the 88th annual session of the National Grange, held in Spokane, Wash., Nov. 8-18. An annual publication of the National Grange, 744 Jackson Place, N. W., Washington, D. C.

THE TOBACCO MOTH AS A PEST IN FARMERS' PACK HOUSES, By Joseph N. Tenhet and Clarence O. Bare. Describes the insect and methods of control; contains three photographs illustrating infestation. Publication BS-CA #4, USDA, Agricultural Marketing Service, Biological Sciences Branch, Stored-Product Insects Section, Richmond, Va.

CATALOGUE OF AROMATICS AND SOLVENTS. The properties, specifications, and applications of each solvent are presented. A publication of Eastern States Chemical Corp., Houston, Texas.

THE 57TH REPORT ON FOOD PRODUCTS AND THE 45TH REPORT ON DRUG PRODUCTS, 1952, by H. J. Fisher. A summary of the examination of foods, drugs, cosmetics and miscellaneous materials submitted by the food and drug commissioner and the commissioner of farms and markets during the calendar year 1952, together with related materials analyzed for health departments and other agencies. Bulletin 585, The Connecticut Agricultural Experiment Station, New Haven, Conn.

THE NUTRITIVE VALUE OF COLLARDS. The report consists of two parts: Part 1, The Effects of Nitrogen Level, Variety, Maturity, and Cooking on Vitamin and Mineral Content, and of Storage on Vitamin Content of Collards; and Part 2, The Effects of Nitrogen and Lime Level on the Vitamin and Mineral Content, and the Proximate Analyses of Collards. Southern Cooperative Series, Bulletin 39, published jointly by the agricultural experiments stations of Mississippi, North Carolina and Virginia.

COASTAL BERMUDA GRASS, by Glenn W. Burton, Georgia Coastal Plain Experiment Station, Tifton, Ga. A report of cooperative investigations at Tifton, Ga. by the Field Crops Research Branch of the U. S. D. A., the Georgia Coastal Plain Experiment Station and the Georgia Experiment Station. Contains Illustrations and charts. Bulletin N. S. 2, Sept. 1954, of the Georgia Agricultural Experiment Stations and the University of Georgia, College of Agriculture.

GYPSUM AND OTHER SULFUR MATERIALS FOR SOIL CONDITIONING. How to decide whether any of these materials might improve the physical condition of a soil; and if so, which one and how much to use. Station Circular C 403, California Agricultural Experiment Station and Extension Service, University of California, Berkeley, Calif.

SELECTIVE WEED KILLERS. Describes herbicides that kill weeds but do not injure crops if applied correctly. Discusses the most important of the new organic compounds including; dinitro selectives; selective oils;; 2,4-D; 2,4,5-T; pentachlorophenol and its salts; I. P. C.; T. C. A.; phenyl mercuric acetate; potassium cyanate; and others. Extension Circular X 157, California Agricultural Experiment Station and Extension Service, University of California, Berkeley, Calif.

CHEMICAL WEED-CONTROL EQUIPMENT. A handbook of weed-spraying equipment of interest to both farmers and manufacturers. Describes and suggests choice of different types of sprayers and equipment for various spray jobs—rigs, booms, nozzles, airplane spraying, etc. Also has section on calibration. Station Circular C 389, California Agricultural Experiment Station and Extension Service, University of California, Berkeley, Calif.

HERBICIDAL USE OF CARBON DISULFIDE. Detailed report on experiments with this chemical for the control of wild morning-glory and other deep-rooted perennial weeds. Bulletin B 693, California Agricultural Experiment Station and Extension Service, University of California, Berkeley, California.

FERTILIZING VEGETABLES, by S. B. LeCompte, Jr. A report on fertilizer experiments with five varieties of sweet corn and three varieties each of spinach, sweet peppers and bunch onions; the soil used was a sassafras loam. Crop yields improved most frequently with increased phosphorus supply. "New Jersey Agriculture," Vol. 36, No. 6, Nov.-Dec., 1954.

FUMIGATION OF DRY BEANS AND COWPEAS ON THE PACKAGING LINE, by Elmer L. Mayer and Howard D. Nelson, USDA. A report of studies begun in 1951 to develop a method of fumigating each individual retail package of beans or cowpeas on the packaging line, by adding a measured amount of fumigant to the filled package just prior to sealing. Bulletin AMS-4, United States Department of Agriculture, Agriculture Marketing Service, Stored-Product Insects Laboratory, Fresno, California.

PROCEDURE FOR THE FUMIGATION OF DRY BEANS AND COWPEAS ON THE PACKAGING LINE. Describes the procedure developed through experiments by USDA research workers. Contains illustrations. (See item above). Bulletin AMS-5, United States Department of Agriculture, Agricultural Marketing Service, Stored-Products Insects Section.

"Best time-saver I know of

is the burlap bag," says A. R. Baggett, prosperous truck-farmer of Suffolk, Virginia. "There's no wasted, spilled fertilizer with strong-seamed burlap bags that stand up to rough handling. They stow better and take less men for loading and unloading. I've been a burlap man for 35 years—*was, have been, and always will be.*"

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WASHINGTON Report

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

FARMERS are aiming at another year of big production. Despite such handicaps as falling prices, drought, and acreage restrictions, they are gearing up to plant more acres in crops this year than they did in 1954.

Corn planting is already under way. How much will be planted depends largely on the weather, but if farmers go through with their intentions, about 82 million acres will be devoted to corn. That's just a hair more than last year. In fact, several key corn belt states plan increases in corn acreage including: Iowa, Minnesota, Nebraska, Wisconsin, South Dakota, and Michigan.

Acreage of these crops is expected to set new records this year: oats, barley, sorghums, and soybeans.

Potatoes are running smack into trouble, with the government warning growers to cut acreage. Indications are, however, for a crop of 1.4 million acres, slightly above last year.

Cotton acreage will be sizeable, too, despite congressional turn-downs of several proposals to increase it further, specifically the decision not to subsidize exports during this current marketing season. The resulting slow-down in cotton exporting has caused the USDA to increase its carry-over figure to 10.2 million bales. This is 600,000 bales more than a year ago. The price support at 90 per cent of parity should give growers a good return, provided fertilizer and pest control programs are followed.

This review of planting intentions showing prospects of record acreage of many crops points up the difficulties of attempting to reduce agricultural production. It's like squeezing a balloon, with the reduction in wheat acreage showing up in "bigger fields" of other crops.

Certainly fertilizer manufacturers face no shortage of acres upon which to "sell their wares," with planting intentions a total of 3.2 million acres over last year. Farmers raising crops under acreage controls have an additional incentive to apply even more fertilizer to offset the effect of the controls.

* * *

Somewhat the same holds true of pesticides. However, weather affecting insect populations seem to be the dominant factor. According to the latest USDA report, dry weather in 1954 reduced the infestation of insects in the south and southwest one-half to two-thirds of the volume the year previous. This was offset in part by infestations elsewhere which added to "the growing practice of chemical control" resulted in "a higher overall consumption of insecticides in 1954 than in either 1952 or 1953."

In the case of cotton in 1954, the acreage cut back in California had little effect on pesticide sales, while in the south it appears to have been a factor in limiting the use of pre-emergence herbicides, according to Harold H. Shepard, Commodity Stabilization Service, U.S. Dept. of Agriculture, in the *Pesticide Situation for 1954-55*.

Production of several insecticides increased, whereas others declined, and a few firms have discontinued production of at least some pesticidal chemicals. The report further states that "some pesticides have been partially displaced by newer ones in this highly competitive field."

Despite conditions last year which kept demand for cotton insecticides at a low level, domestic consumption of chlorinated hydrocarbons, including aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene was 30 to 35 per cent higher than in 1953. Production of parathion and malathion was increased last year. DDT enjoyed an active export market and production during the crop year October 1, 1953, through September 30, 1954, was 90,712,000 pounds, according to the U.S.D.A.

* * *

The seed trade is strengthening its promotion program among suburban gardeners with heavy emphasis on television. Two of the current programs include a TV film, "High Fashion," featuring the Maid of Cotton and released by the National Cotton Council. This film, being shown nationally, promotes the All-America Flower and Vegetable selections and emphasizes the importance of good gardening. The American Seed Trade Association has also developed a TV kit in cooperation with the USDA, emphasizing the importance of research in the development of new flower and vegetable varieties.

These projects are complete in themselves as far as development and financing, nonetheless an area of cooperation is indicated which could be further developed among fertilizer and pesticide companies as well as others in the garden supply field for the goal of general garden promotion. Certainly the more that is done to broaden the base of the market, the more dollars there should be for which each company can compete.

* * *

The top policy committees of two USDA research projects consider the problem of pest control of top importance. These committees are the Vegetable Research and Marketing

(*Continued on Page* 113)

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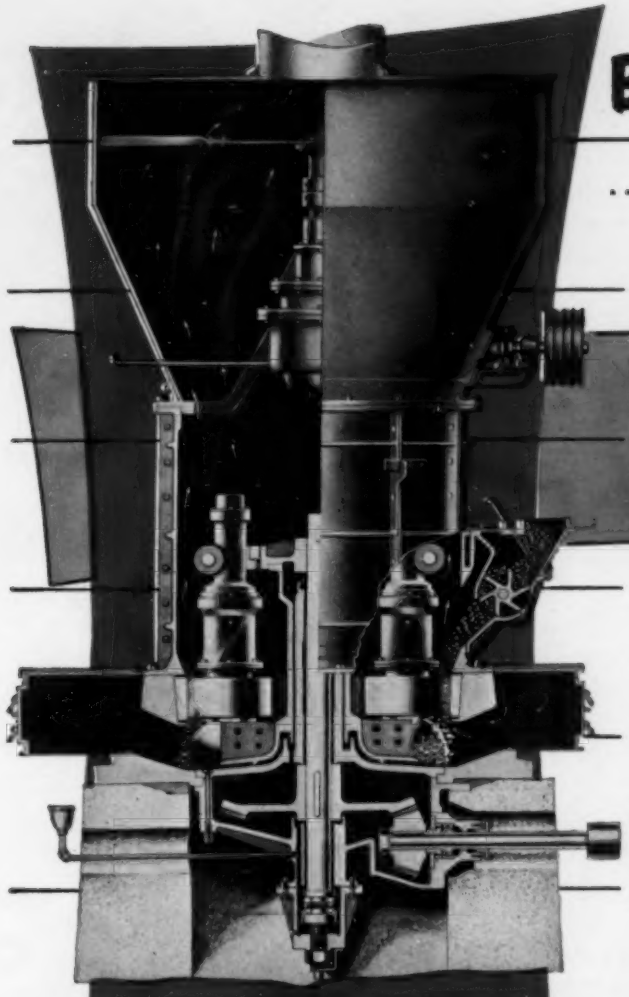

Cross section of Roller Mill showing how material is ground by rolls rotating against bull ring, then air swept to separator which extracts fines and returns coarse material to mill for regrinding

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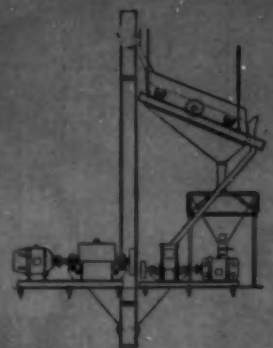

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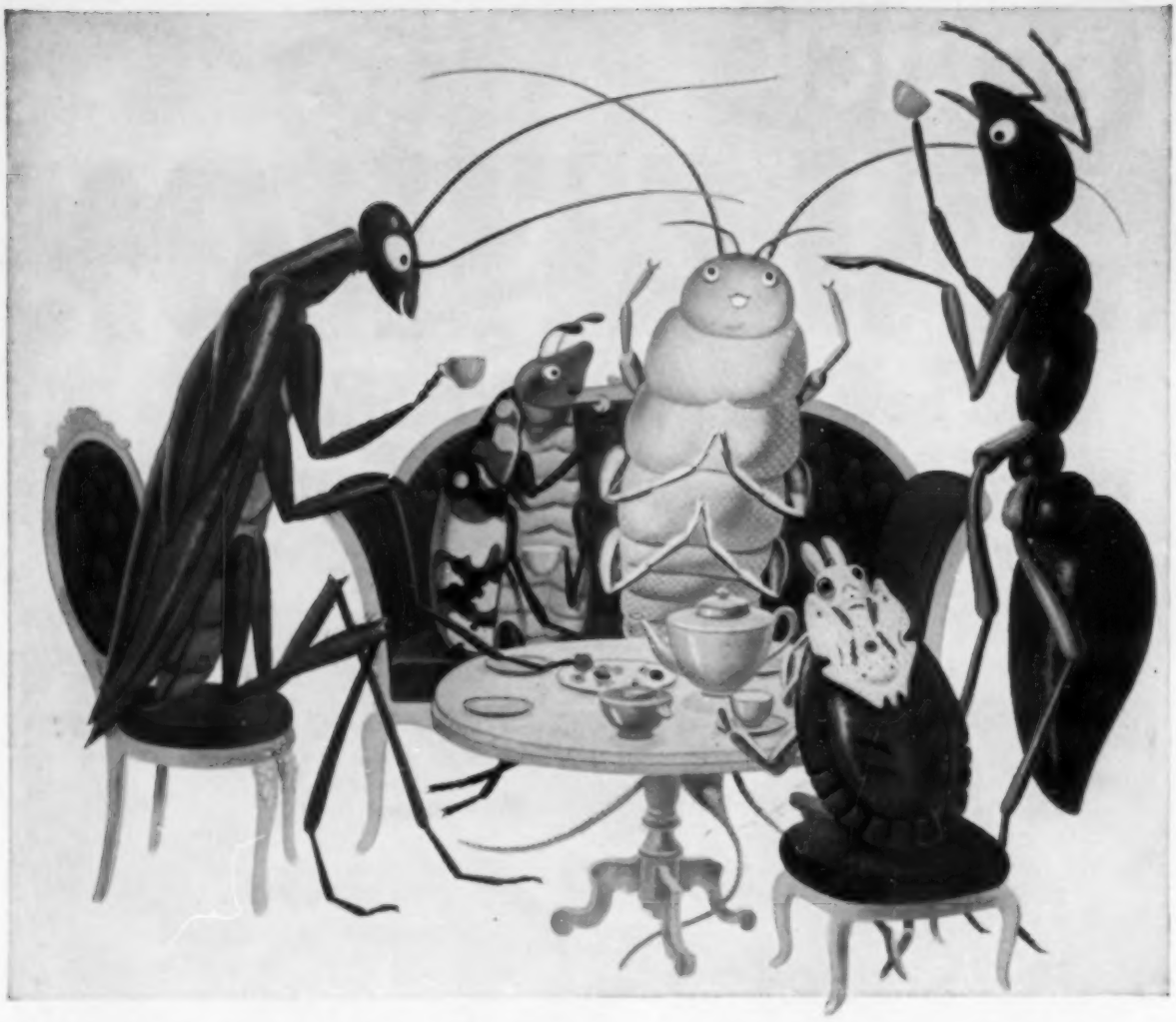

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INDUSTRY News

Climax Appoints Ekholm

Appointment of Lars E. Ekholm as manager of the sales division was announced April 19th by Climax Molybdenum Co., New York.

Mr. Ekholm has been with Climax Molybdenum since 1946. Since that time he has held several executive positions in the sales department, including direction of foreign sales.

•

Canadian ESA Meets in Oct.

The fifth annual meeting of the Entomological Society of Canada will be held October 18-20, 1955 at Fredericton, B. C. The meeting will be held jointly with that of the Acadian Entomological Society.

•

W. E. Zimmerman Joins Velsicol

W. E. Zimmerman has been appointed Velsicol sales representative in Florida. He was formerly with the American Cyanamid Company and the O. E. Linck Company.

•

Allyl Alcohol in Test Market

Several thousand gallons of allyl alcohol have been used commercially this year, in a select distribution program test-marketing this pesticide material. Shell Chemical Corp., New York, decided to test the product commercially, following a successful experimental program last year. Because the 1955 applications were made in Jan. and Feb., there are as yet, no data on the current tests.

Allyl alcohol is reported to be particularly successful in treatment of tobacco beds. Although it has high mammalian toxicity, and requires care in handling, it leaves no residue on the crop and is not harmful to flavor. It has the further advantage of ease of application, and because of low volatility, does not require sealing of the seed beds. Shell Chemical reports that other uses of the compound may include weed seed treatment, use in forests, nurseries, ornamentals, etc.

National Plant Food Institute to hold First Meeting

Russell Coleman

Paul Truitt

THE two leading trade associations in the fertilizer industry will join June 12-15 in the preliminary convention of the National Plant Food Institute.

It will constitute the annual meetings of the membership of both groups, which will be consolidated July 1. Russell Coleman, president of National Fertilizer Association and Paul T. Truitt, president of American Plant Food Council, estimate that more than 800 will attend.

Members of the enlarged organization, which is expected to fill the Greenbrier Hotel, White Sulphur Springs, W. Va., will hear two panels and three addresses by government officials. Heading the latter group will be E. L. Peterson, assistant secretary of agriculture, who will talk Tuesday June 14.

McClellan To Speak

Sen. John L. McClellan (D-Ark), chairman of the Senate Committee on government operations, will address the NPFI convention Wednesday morning, along with the chairman of the House Committee on Agriculture, Harold D. Cooley (D-N. C.), a popular speaker at recent fertilizer conventions.

The panels will be concerned with fertilizer-pesticide mixtures and the views of youth on the agricultural

situation. The first, sponsored by the technical services committees of NFA and APFC, is scheduled for Monday morning.

M. V. Bailey, technical director of the agricultural chemicals division of American Cyanamid Corp., will preside. Panelists will include: K. D. Jacob, USDA; C. T. Harding, Virginia-Carolina Chemical Corp.; John D. Conner, Washington attorney; and Rodney C. Berry, Virginia State.

Prof. William B. Ward, head of the department of extension teaching and information, Cornell University, will preside at the youth panel on Tuesday. Panelists will include William D. Gunter, national president of the Future Farmers of America, Live Oak, Fla.; Lamarr Ratliff, 4-H club representative from Baldwin, Miss.; and Joseph Strickland and Thomas Dotson, National Junior Vegetable Growers Association, both from Summersville, W. Va.

Board Meeting

The board of directors-elect of NPFI will meet Monday morning before the fertilizer-pesticide panel. E. A. Geoghegan, chairman of the board of NFA and Edwin Pate, chairman of the executive committee of APFC, will make opening remarks.

Before the Congressional talks Wednesday morning, Louis H. Wilson, secretary and director of information for APFC, will present Soil Builders Awards to editors for journalistic contributions toward building the nation's soils. George Gage, Gage Fertilizer Co., Anderson, S. C. will read an in memorium resolution.

The usual program of sports and social events for the women is scheduled for Monday afternoon. A refreshment hour at 6:30 Monday evening, courtesy of nitrogen producers will precede dinner. Another cocktail party, with the potash producers as hosts, will precede the annual banquet Tuesday evening.★★

Va. Fertilizer Executive Dies

Waverly Summerfield Manson, 82, retired executive of a fertilizer manufacturing concern in Va., died April 3. He was one of the founders and the first general manager of Farmers Co-operative Fertilizer Purchasers, Inc., Kenridge, Va.

•

Holden Joins Chemagro

Mr. Kenneth R. Holden has recently joined the sales division of Chemagro Corp., New York. For the past four years, Mr. Holden has been in charge of the insecticide screening laboratory of the Niagara Chemical Division of Food Machinery and Chemical Corporation at Middleport, New York. Mr. Holden will represent Chemagro Corp. in product sales and field research in the Southeast, with headquarters to be established in Atlanta.

•

Velsicol Moves N. Y. Office

Velsicol Corporation has moved its New York office to new and larger quarters in the Empire State Building, New York City. All activities pertaining to the sale and distribution of Velsicol products in foreign markets and on the Eastern seaboard will be directed from the new Empire State Building address.

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Growth-Inhibiting Pesticides

Chemicals that inhibit the normal development of insects are being studied by U. S. Department of Agriculture scientists. Preliminary investigations indicate that there are a great number of these growth-inhibiting chemicals, of which piperonyl butoxide appears to be one of the most promising. Some tests show the use of piperonyl butoxide in this manner was more effective against the larvae of DDT-resistant flies than against those of normal flies. In one of the experiments, only 3 per cent of the resistant flies became adults; while 16 per cent of normal flies survived.

•

Spanish Minister of Agri. Here

Rafael Cavestany, Spanish Minister of Agriculture arrived in New York April 15 and told members of the press that he will study American agricultural techniques during an intensive four-week tour of farmlands in this country. Currently importing 50,000 metric tons of rock phosphates from the United States, he reports that Spain plans to double that figure this year.

Following a conference with Ezra T. Benson and Secretary of the Interior Donald McKay, Mr. Cavestany began a tour of farmlands in Maryland, California, Texas, Oklahoma, Kansas, Illinois, Ohio, and Ontario, Canada.

•

Stauffer to Build at Omaha

Stauffer Chemical Co., N. Y., recently purchased a tract of land at Omaha, Neb. for construction during 1955 of an agricultural chemical plant. Hans Stauffer, president, has announced that the new facility will produce dust and liquid insecticides, herbicides and grain fumigants. Present plans also call for construction of a warehouse to handle storage and distribution of the complete line of Stauffer chemicals.

•

Nopco Names New President

The election of Ralph Wechsler of Maplewood, N.J., as president has been announced by the board of directors of Nopco Chemical Co., Harrison, N.J. He will succeed Thomas A. Printon, president since 1949. Mr. Printon will continue to serve as chairman of the board. Prior to election as president, Mr. Wechsler had served as treasurer.

•

New Smith-Douglass Hdqs.

Construction of a modern, two story office building is underway for the Smith-Douglass Co. at Norfolk, Va. The company expects to move into its new headquarters by the end of 1955.

•

Mathieson Names McLaurin

J. F. McLaurin, past president of the National Cotton Ginners Association, has been appointed sales representative for finished insecticide products in South Carolina for Olin Mathieson Chemical Corporation.

•

Am Potash Moves NY Office

American Potash and Chemical Corp. has moved its Eastern Sales Division to expanded new quarters, at 99 Park Avenue, New York City.

The offices, which include a communications room, cover 5,415 square feet of air-conditioned space on the 15th floor.

Stauffer Earnings Up

Stauffer Chemical Co., New York, recently issued a 1954 report to stockholders, announcing total sales of $82,582,000 during the year, of which $20,208,000 were in agricultural chemicals. Profit increase over 1953 was 8 per cent for the company as a whole and 13 per cent for agricultural chemicals. In addition to financial statements, the report comments on research and development, personnel changes and business outlook for the future.

•

New Baughman Division

The Baughman Manufacturing Co., Jerseyville, Ill., manufacturers of conveying and spreading equipment, has announced the opening of a new division in Lakeland, Florida, under the management of Wm. Jones.

The Division will handle the complete Baughman line, including fertilizer spreaders, feed and fertilizer blenders, automatic self unloading bulk feed delivery bodies, and bulk material transport bodies, and portable and stationery conveyors.

•

Minn. Firm Opens New Office

The Mackwin Co., Winona, Minn., manufacturers of insecticides and related agricultural chemicals, recently opened a branch office and warehouse at Des Moines, Iowa to handle central states sales and distribution. E. M. Billings, a graduate of Iowa State College, was appointed supervisor of the new office.

•

St. Regis Appointments

St. Regis Paper Co., New York, announced recently that Justin H. McCarthy has been named vice president. Mr. McCarthy joined St. Regis in 1946 as plant engineer at the Tacoma, Washington, mill.

Also announced are the appointments of the following assistant vice presidents of St. Regis Paper Co.: John K. Ferguson, assistant to Edward R. Gay, executive vice president; William W. Gordon, general sales manager for all Panelyte products; Gardiner Lane, director of the product development department; Bernard W. Recknagel, assistant secretary; Andrew F. Storer, assistant to vice president in charge of sales; and Charles A. Woodcock, general sales manager, Multiwall Packaging Division.

•

Straube Joins Stauffer

Harlod L. Straube has been appointed to the agricultural sales division of Stauffer Chemical Co., New

H. L. Straube

York. He formerly was associated with John Powell & Co., holding various posts in agricultural chemical research, sales, production and purchasing.

•

Hold Sanitation Course

The Sixth Annual Short Course on Insect and Rodent Control for Sanitarians, was held April 6th-7th at Purdue University, Lafayette, Ind., will feature reports on the U. S. Government's grain sanitation program and discussions on the classification and use of insecticides and rodenticides.

The annual meeting is sponsored by the Indiana State Board of Health, the Fish & Wildlife Service of the U. S. Department of Interior and Purdue University, with the cooperation of the U. S. Public Health Service. J. J. Davis, Purdue University, presided over the meeting.

•

Cleary Joins Lo Bue

Thomas F. Cleary, formerly vice-president and director of research for Chemagro Corp., New York, has joined Philip J. Lo Bue Co., also New York, as sales manager for fine organic intermediates.

Complete Costa Rica Ag Plant

A new agricultural chemicals plant of Quimicas Agricolas Centro-Americanas, Ltda., San Jose, Costa Rica was completed recently and has been in operation this past month. A clay handling and pre-crushing installation is still to be completed and should be in operation early in May. A formal dedication and opening is expected at that time.

J. P. McKenna has been in charge of construction and installation.

•

New Pensacola Fertilizer Plant

Construction of a $30,000 petrochemical plant has been started at Pensacola, Fla., for the Escambia Bay Chemical Corp. Actual production of ammonia and nitrogen products is expected to commence early in 1956. According to an announcement by M. A. Abernathy, president of Escambia, it will be the only plant of its type on the Gulf Coast east of New Orleans and will serve Florida, Georgia, southern Mississippi, southern Alabama and parts of South Carolina.

Sale of the plant's production, which will include anhydrous ammonia, ammonium nitrate, nitric acid, nitrogen solutions and other by-products for industrial and agricultural use, will be handled exclusively by Achcraft-Wilkinson Co., Atlanta.

•

Shell Petitions for Tolerances

Petitions have been filed with the Food & Drug Administration by Shell Chemical Corp., New York, for residue tolerances for aldrin and dieldrin on certain raw fruits and vegetables. The petitions propose one pppm for each of the pesticides used on a selective list of products.

•

Pennsalt Pres. to Retire

Hugh C. Land will succeed William P. Drake as head of the Pennsylvania Salt Manufacturing Company's Industrial Chemicals Division. Mr. Drake recently was named executive vice president when President George B. Beitzel announced plans to retire later this year upon completion of 25 years' service with the company.

56,000,000,000 QUARTS

Healthy, well-nourished dairy cows produced over 56-billion quarts of milk last year, enough to float several of the largest ships in the U. S. Navy—and enough to assure every American plenty of milk, cheese, butter and ice cream. Nutritious grass and fodder, grown in soil made rich by modern commercial fertilizers, help cows maintain this high productivity.

Potash, an important component of these fertilizers, enriches the soil, improves crop quality, builds resistance to disease and increases crop yield. United States Potash Company's high-grade muriate of potash has the highest K_2O content, and is free-flowing and non-caking—important advantages in the manufacture of fertilizers that help raise the production and quality of the nation's milk.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

UNITED STATES POTASH COMPANY

INCORPORATED

30 Rockefeller Plaza, New York 20, N.Y.

Southern Sales Office
Rhodes-Haverty Building, Atlanta, Georgia

SUNSHINE STATE POTASH PRODUCT OF NEW MEXICO

REG. U. S. PAT. OFF.

R. H. Hodgson

G. D. Baerman

G. A. Wakefield

Hill Discusses Poison Labeling

Uniform labeling of dangerous chemicals and drugs to alert users to the hazards in their improper handling was stressed by Sanford J. Hill of the E. I. du Pont de Nemours and Co., Wilmington, Del., in an address before a meeting of the American Conference of Governmental Industrial Hygienists, Apr. 25 in Buffalo.

Mr. Hill pointed out that "poison" warnings should be strictly limited to those substances that are actually poisonous to human beings. The use of laboratory animals is considered the most reliable method of ascertaining toxicity.

"The Federal Caustic Poison Act" and the various state poison and pharmacy acts chiefly relied in most cases wholly on the word 'poison' to warn the user. Since most chemicals covered by these laws are hazardous mainly by ingestion, the laws met an existing need but are hardly adequate for today's products," he observed.

New Mathieson Execs

Sales managers in the agricultural chemicals division of Olin Mathieson Chemical Corp., Baltimore, have been named by the company.

R. H. Hodgson, formerly in charge of domestic sales in the company's John Powell division, is now manager, retail sales, of the Eastern Fertilizer division. Donald T. Fangmeyer, formerly manager of bulk superphosphate sales, is manager of the Eastern Fertilizer division's wholesale sales department.

G. D. Baerman, formerly with the John Powell division, is manager of agricultural sales in the expanded Insecticides division. Paul Williams is assistant manager. Alfred Weed, also formerly with Powell, is manager of the Household Sales department.

Both the Eastern Fertilizer and Insecticides divisions are headquartered in Baltimore.

In the Western Fertilizer division, G. A. Wakefield is sales manager and Paul F. Schowengerdt is assistant sales manager. David Dickey is sales manager for the Western Sulphur and Acids divisions.

•

FOA Fertilizer for India

58,500 tons of chemical fertilizers will be purchased for India by the Foreign Operations Administration between September of this year and February, 1956, according to a recent FOA announcement. The cost of the fertilizer is estimated at $5.2 million, which will be supplied from FOA Development Assistance Funds.

Ammonium sulphate and three chemicals new to India—ammonium sulfate nitrate, urea and nitrochalk nitrate sulfate—will be included in the purchase. It is expected that the ammonium sulfate will be shipped in January and February, 1956, while the three new types will be on their way to India by September, 1955.

New Swift Genl. Manager

Arthur F. Miller, Western Springs, Ill., general manager of the Plant Food division for Swift & Company since 1947 retired April 1. He is succeeded by William F. Price, Hinsdale, Ill., who has been assistant manager of the Plant Food division since 1952.

•

Pacific Borax Herbicide

The Pacific Coast Borax Co.'s Agricultural Sales Division announces the introduction of DB-Granular, a weed killer designed for agricultural weed problems including deep-rooted noxious perennial weeds. DB-Granular is a complex of disodium tetraborate and 2,4-dichlorophenoxyacetic acid. This new herbicide is applied in dry form just as it comes from 50 lb. multi-wall paper sacks. DB-Granular for agricultural use is a companion product to the company's new Ureabor introduced last month for industrial weed problems.

•

Corn Earworm Control Tests

Both a phosphate insecticide (OS-2046) and DDT have been used to control corn earworms damaging sorghum heads, despite the protection the worms get from the sorghum heads while feeding in them.

C. C. Burkhardt, entomologist who had charge of research with the insecticides at Kansas State College, said the phosphate insecticide killed 96 per cent of the worms within 24 hours after application and 100 per cent within 72 hours. DDT killed 84 per cent within 24 hours; 95 per cent within 72 hours.

Burkhardt applied the phosphate insecticide at the rate of 8 ounces of toxicant per acre. He first diluted the toxicant in 46 gallons of water, but he thinks considerably less water can be used successfully. "All the dilution needed is enough to spread the insecticide evenly," he said.

In the same tests at the K-State agronomy farm, endrin and lindane killed 72 per cent and 90 per cent, respectively, of the corn earworm larvae within 72 hours. Toxaphene, parathion, and heptachlor were less effective.

Now in effect....

MILLER PESTICIDE RESIDUE AMENDMENT

as

Public Law No. 518

- Amends the Federal Food, Drug and Cosmetic Act.
- Establishes a new procedure for setting residue tolerances.
- Limits the amount of pesticide residue permitted on raw agricultural commodities.

For further information on this new Amendment write the executive secretary

NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

1145 NINETEENTH STREET, N. W. WASHINGTON 6, D. C.

St. Regis Has New Multiwall

St. Regis Paper Co., New York, is marketing a new multiwall bag utilizing rayon thread and flat kraft tape in its closure. The company claims that rayon has greater tensile strength than cotton thread of equal weight, and, as a man-made fiber, permits better quality control and a greater uniformity of properties.

Advantages of fiflat tape, according to the company, are a better looking closure, offering a superior printing surface, and greater strength than crepe paper.

At the present time, flat tape can not be sewn with existing Union Special 80,600-H sewing heads in use in customers' plants; however, any sewing machine can be readily converted to use of rayon thread, according to the company.

•

British Proceedings Available

Proceedings of the Second British Weed Control Conf., held Nov., 1954 at Harrogate, England are now available from W. A. Williams, Association of British Insecticide Manufacturers, Cecil Chambers, 86 Strand, W. C. 2. The proceedings contain all the formal papers and research reports that were presented at the conference, together with an edited version of the discussion.

•

Pesticide Effect on Wildlife

The Pesticide Handbook, compiled for the Pesticide School of North Carolina State College, which was held at Raleigh last January, contains among other valuable information, two articles relating to the effect of pesticdies on fish and wildlife. One article entitled, "Effect of Some New Insecticides on Fish and Wildlife," bp James R. Fielding and William P. Badlwin of the U. S. Fish and Wildlife Service, summarizes the information available on this subject in good detail and presents an excellent bibliography. A second paper, "Plant Pesticides and Wildlife," bp Paul F. Springer, U. S. Fish and and Wildlife Service, Laurel, Maryland, discusses fungicides and herbicides along similar lines. It too has a good bibliography for those interested in more detail.

Information of this type is valuable to all of us working with pesticides and it is good to have this up-to-date review available for study. North Carolina workers are to be commended for giving consideration to this important subject at their annual pesticide conference.

•

Allied to Produce Pesticide

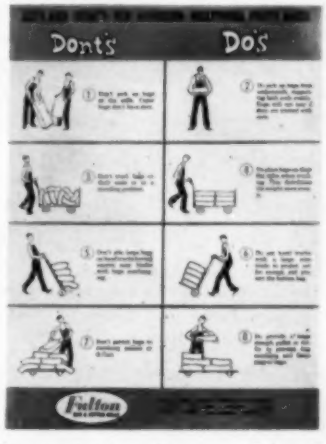
The Barrett Division of Allied Chemical & Dye Corp. will soon begin semi-commercial production of phthalonitrile, a chemical used for control of leaf-feeding insects, according to a recent company announcement.

Facilities are presently under construction in Philadelphia and are scheduled to be completed by the third quarter of 1955.

•

Fulton Poster on Handling

Thousands of dolars are wasted each year through careless handling and unnecessary damage to multiwall paper bags and the products packed in them. In an



effort to eliminate this waste, Fulton Bag & Cotton Mills has prepared a colored poster which illustrates proper and improper methods of bag handling. Designed for use on bulletin boards and in other appropriate plant areas, the poster is illustrated using a modern, simplified cartoon technique. The text is brief, to-the-point and easily understood.

Idea for the poster originated with a booklet—"Safe Storage Tips for Multiwall Paper Bags"—published by the company last year. Many of those receiving the booklet expressed a desire for reprints of the special "Do's and Dont's" section. In response to these requests, the idea for creating the new poster developed.

Spencer Expands in Vicksburg

Spencer Chemical Co., Kansas City, Mo. recently announced a $1,500,000 expansion program at its Vicksburg, Miss., works to be completed by Spring, 1956. New facilities will permit conversion into nitric acid of all ammonia produced by the company at Vicksburg. Present plans, however, call for marketing a portion of the ammonia to industry.

•

Stauffer Names Murphy

Stauffer Chemical Co. has announced appointment of Dr. Douglas R. Murphy as research technical advisor for the midwest region. Dr. Murphy, a Ph.D. of Iowa State College, will headquarter at the company's Chicago office.

•

Stauffer Plant to Start July

Production at Stauffer Chemical Company's million dollar annex to its Vernon fertilizer manufacturing plant will commence by the end of July, the company announces.

The new installation will produce approximately 500 tons per day of pelletized superphosphate and other ammonium phosphate fertilizers, employing an exclusive process developed and designed by Stauffer.

•

Kraft Bag Names Witter

John P. Witter has been appointed by Kraft Bag Corp., subsidiary of Gilman Paper Co., to cover the North and South Carolina-Virginia territory. For the past six years Mr. Witter has been paper merchant representative for Minnesota Mining & Mfg. Company's pressure sensitive industrial tapes.

•

Pyrethrum Labs in Kenya

East Africa pyrethrum growers are financing construction of chemical and entomological laboratories at Nakuru, where the Pyrethrum Board of Kenya has its headquarters.

Functions of the new facilities will include evaluation of pyrethrum flowers for sales purposes, carrying out of investigations required in the agronomic and plant breeding programs and development of new investigational methods and techniques.

Sanitation Seminar Features Grain Storage Discussion

By H. H. Slawson

THE labels placed on pesticide containers are "the most expensive and high priced literature in existence, "Dr. George C. Decker declared in an address at the Sanitation conference in Chicago sponsored by Arwell, Inc., of Waukegan, Ill. "Manufacturers of these products," he said, "expend millions of dollars to get the accurate data summarized in a few lines on these labels. If you read the labels and are governed by them," he added, "everything will be O Kay. If you don't read them, you take a calculated risk."

The Food and Drug Administration, he said, confiscates tons of food yearly, but very little of it is seized because it is contaminated by pesticides. Most of the action is taken because of the filth in the stocks seized.

Continuing, Dr. Decker defined and classified insecticides and outlined what to think of when selecting them for use in a food processing plant, also proper ways to use them there. Evaluating hazards in insecticides, he said, it is axiomatic that all insecticides are toxic, but can be used safely if proper respect is developed for their toxicity.

Drawing a distinction between the terms, he defined "toxicity" as the "capacity to produce harm," while "hazard" implies the "probability of harm." "Hazard," he said, "involves the manner in which the chemical is used. The user should be fully informed on the label regarding this hazard." As insect control gets more complicated, he recommended employment of trained entomologists by food processors.

The government's surplus grain control program over the past twenty years, has greatly magnified the problem of grain sanitation, Howard O. Hunter, executive director of the American Institute of Baking, pointed out. By next July 1, he stated, the government will have control of 1,200,000,000 bushels of wheat. Acceptable storage facilities are not available and much of this stock will have to be stored out of doors.

Very little filth gets into the products of flour mills and bakeries, Mr. Hunter asserted, but the public is going to think differently, if the grain sanitation program is not accelerated soon on all fronts. He reviewed the Food and Drug Administration's action to enforce the laws on contaminated grain and the "violent opposition" this effort has encountered. Much of the conflict, he charged, is due to political pressure on grain belt Congressmen.

The government owns most of the nation's wheat stocks, he pointed out, and one government agency, the Commodity Credit Corporation, which controls it all, he intimated, has been most vocal in obstructing the movement to get the stored grain cleaned up.

A proposed long range educational program, Mr. Hunter declared, is impractical. Grain standards should be revised so that grain for human food is graded on a different basis than that for animal use. At the same time, the Food & Drug Administration should be supported in its honest efforts to enforce the law. These two recommendations, he said, have the backing of the Millers National Federation.

He referred to the Committee of Fifteen, representing all interested parties, which has been developing a grain sanitation program. Their report has been completed, he said, but its release has been delayed.

From a public relations standpoint, Mr. Hunter declared, the situation is "packed with dynamite." Once consumers get wind of the conflicting interests involved in this struggle, he declared, they will demand a cleanup, "even though they can't see any insect fragments or rodent pellets in their food."

Sanitation has made more progress in the dairy field than in any other area of food processing, Dr. W. L. Mallman, professor of bacteriology and public health at Michigan State College, East Lansing, Mich., asserted in discussing "Dairy Sanitation."

Pasteurization has licked the disease hazard and the public health aspect of milk is under control. But quality standards are being affected by the new practice of bulk storage of milk on the farm, which is just coming into use, and by changing methods of handling milk in the processing plant, he explained.

Another feature of the day-long Arwell seminar program was a lecture by Wm. H. Schoenherr, director of sanitation and research for Lauhoff Grain Co., Danville, Ill., who illustrated his talk with colored photographs of insect life in stored grain. Closing the seminar, John D. Meck, head of Arwell's staff of entomologists, called attention to the appearance of the Khapra beetle in western states and stressed the importance of being alert to possible invasion of midwestern grain areas by this insect. He also distributed a mimeographed report, prepared by his company, outlining present knowledge of this new pest. Dow Chemical Co. also sent to the meeting a series of photographs of a recent fumigation job handled in the infested California area, where methyl bromide was the chemical used.

•

Smith-Douglass Safety Award

The Tenoroc and Coronet plants of the Coronet Phosphate Company, Plant City, Florida, a Division of Smith-Douglass Company, Inc. of Norfolk, Virginia were recently rated second and third places, respectively in the annual Smith-Douglass Company's annual safety contest among its 17 plants. A certificate of merit was presented to each of the plant superintendents by Mr. V. S. Gornto for this achievement at a barb-que supper, which was attended by approximately 300 employees.

•

Calspray Advances Thompson

Appointment of Dr. Robert Kruger Thompson to the position of Coordinator of Western Research has been announced by California Spray-Chemical Corp., Richmond, Calif.

Dr. Thompson started with Calspray in 1950 as research entomologist on the field experiment staff at Orlando, Florida.

How Celite Mineral Fillers make a product free-flowing...

Keeping fertilizers "On the run"

REALIZING their product is one that cannot "cake-up" and still survive in a competitive market, leading producers of fertilizer use one of the Celite Mineral Fillers as a standard "anti-caking" ingredient.

The ability of Celite Fillers to keep a product free-flowing results from their high absorption properties and unique diatom structure—properties which make them unusually effective safeguards against caking in deliquescent materials. They are two of the unusual physical characteristics that adapt these diatomaceous silica powders to numerous industrial uses.

THESE CELITE PROPERTIES BENEFIT MANY TYPES OF PRODUCTS

Because of their inertness and great bulk per unit of weight, Celite Mineral Fillers make ideal bulking agents for powders and pastes. Their tiny multi-shaped particles interlace to stiffen and strengthen admixtures. The microscopically small facets of these particles diffuse light so effectively that they can be utilized to impart any desired degree of flatness to a surface film. Their light, porous nature improves suspension, helps prevent segregation. And their porous, thin-walled cellular structure imparts a delicate non-scratching abrasive action.

You may find Celite the "extra something" needed to lift your product above competition. Why not discuss its application to your problem with a Celite engineer? Or write for further information and samples to Johns-Manville, Box 60, New York 16, N. Y. In Canada: 199 Bay St., Toronto, Ont.

CHECK LIST OF PRODUCT BENEFITS OBTAINABLE AT LITTLE COST WITH CELITE MINERAL FILLERS

- Added Bulk
- Better Suspension
- Faster Cleaning Action
- Greater Absorption
- Improved Color
- Better Dielectric Properties
- More Durable Finish
- Increased Viscosity
- Elimination of Caking
- Higher Melting Point
- Better Dry Mixing
- Improved Dispersion

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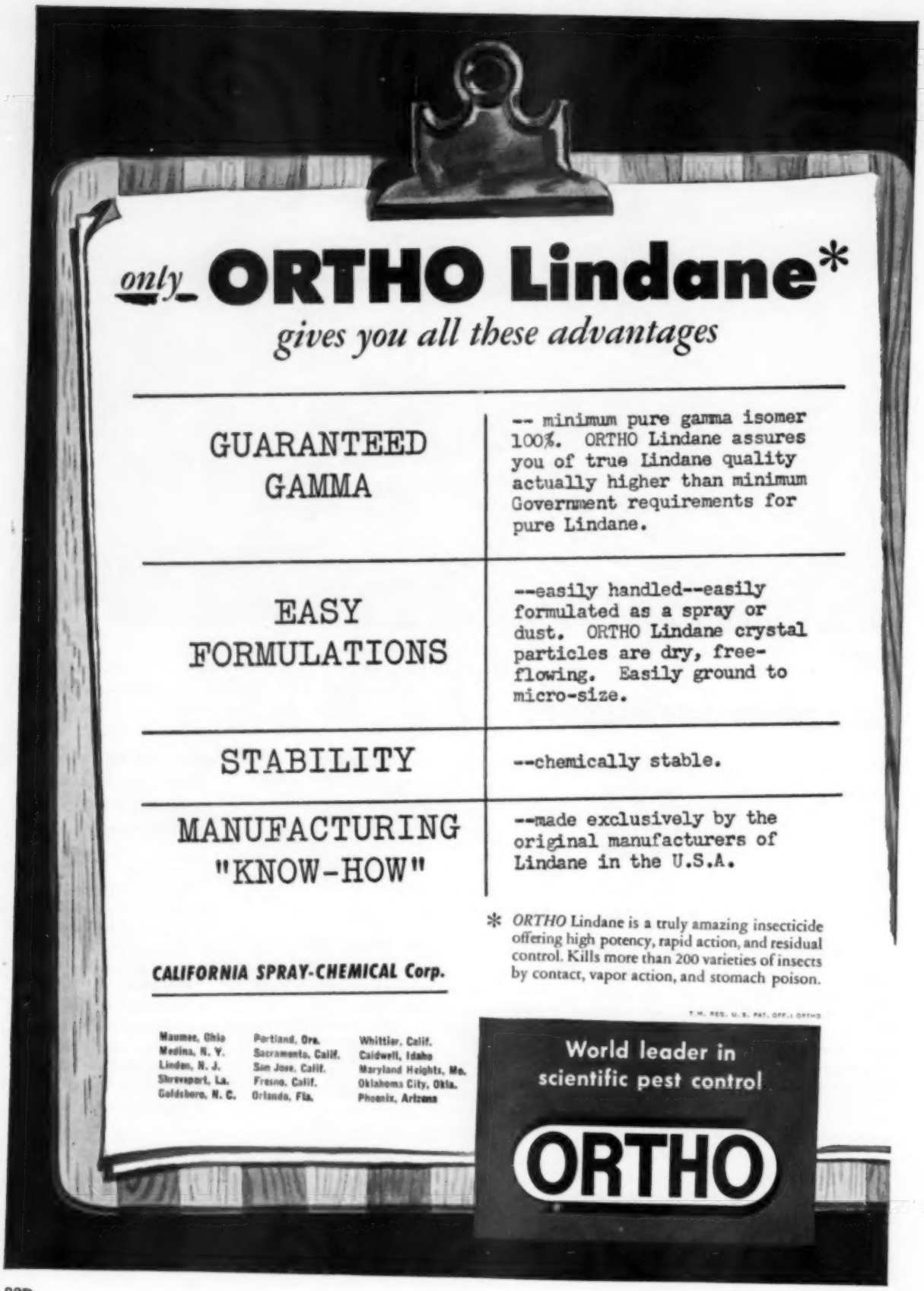
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EASY FORMULATIONS
--easily handled--easily formulated as a spray or dust. ORTHO Lindane crystal particles are dry, free-flowing. Easily ground to micro-size.
STABILITY
--chemically stable.
MANUFACTURING "KNOW-HOW"
--made exclusively by the original manufacturers of Lindane in the U.S.A.
* ORTHO Lindane is a truly amazing insecticide offering high potency, rapid action, and residual control. Kills more than 200 varieties of insects by contact, vapor action, and stomach poison.
CALIFORNIA SPRAY-CHEMICAL Corp.
Maumee, Ohio
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Maryland Heights, Mo.
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Phoenix, Arizona
T. M. REG. U. S. PAT. OFF.: ORTHO
World leader in scientific pest control
ORTHO

Cont Can Names Nelson Mgr.

Mr. R. F. Nelson has been appointed general manager of sales for the Shellmar-Betner Division of Continental Can Co., New York. Mr. Nelson will maintain his office at the Mount Vernon, Ohio headquarters of Shellmar-Betnar.

He was formerly vice president of Rhinelander Paper Co. and prior to that president of the Glassine Paper Co., Mr. E. F. Burke has been transferred to the position of manager of sales, central division of the Shellmar-Betner Division, with his office in Chicago.

•

Tolerance Extension Asked

Velsicol Corp., division of Arvey Corp., Chicago, recently applied to the Food and Drug Administration for an extension of the tolerance of 0.1 part per million for residues of heptachlor on potatoes.

The application asked that the tolerance be extended to include the following raw agricultural commodities:—alfalfa, clover, and sweet clover; beets, including sugar beets; cabbage, brussels sprouts, kohlrabi, and cauliflower; corn; cotton; pasture and range grass; onions; peanuts; peas; sugarcane; sweet potatoes; and turnips.

•

Ohio Pesticide Institute Meeting

The 1955 meeting and field tour of the O. P. I. will be held at Wooster and various points in Northern Ohio. The dates are August 9, 10, and 11. The first two days of this period will coincide with a meeting of the North Central Division of the American Phytopathological Society, also to be held in Wooster, on August 8, 9, and 10.

•

Young Appoints Syntron as Rep

Mr. D. G. Black, vice president in charge of sales of the Syntron Co., Homer City, Penna., and Mr. William J. Geist, general sales manager of the Young Machinery Co., Muncy, Penna., jointly announced that arrangements have been completed whereby the Syntron Company sales representatives will handle the sale of Young's Transvair Pneumatic Conveying systems.

The Young Machinery Company will design and manufacture the complete transvair systems including the transvair turbine fans, transvair collectors, rotary air lock feeder valves, and piping at their Muncy, Pa., plant.

•

Pacific ESA Meet at Riverside

Entomologists from nine western states, Hawaii, Canada and Mexico will gather in Riverside, California, June 22-24, for the 39th annual meeting of the Pacific Branch, Entomological Society of America.

Included among the many research reports to be given are two dealing with the yellow clover aphid and the Khapra beetle, which are currently of great economic importance. Special attention will also be given to the Mexican and Oriental fruit flies.

Invitational speakers will report on recent advances in air carrier spray equipment in citrus orchards and parasitic mite larvae. Aerial spray application of insecticides and insect population dynamics will also be discussed.

John B. Steinweden, regional coordinator for the California Department of Agriculture, is chairman of the Pacific Branch. Martin M. Barnes, entomologist on the Riverside campus of the University of California, is program chairman. Meeting headquarters will be in the Mission Inn, 3649 Seventh St., Riverside. It is anticipated that a large number of the 1,000 branch members will participate in the conference.

•

Limestone Institute Holds Conf.

Highlight of the tenth annual convention of the National Agricultural Limestone Institute, held recently in Washington, D. C. was a panel discussion on the Agricultural Conservation Program. Featured also were speeches by Senator Frank Carlson (Republican, Kansas) and congressman Jamie L. Whitten (Democrat, Miss.), and a panel discussion on promotion of agricultural limestone.

Kapusta Joins U.S. Potash

United States Potash Co., New York, has just announced the appointment of Edwin C. Kapusta as technical service director. Dr. Kapusta will join the staff of United States Potash on July 1st.

Dr. Kapusta has been with the National Fertilizer Association, serving as its chemical engineer, since July, 1951. He is a graduate of Rensselaer Polytechnic Institute, was awarded his master's degree from Worcester Polytechnic Institute, and his Ph.D. in chemical engineering from Iowa State College where he was engaged in fertilizer research for the engineering experiment station of the college. He served in the Naval Reserve during 1943-46 and was previously with the American Cyanamid Company at its Stamford Research Laboratory.

Dr. Kapusta is presently in charge of the National Fertilizer Association's work in the field of technical service and research on fertilizer manufacturing technology involving liaison between the National Fertilizer Association and state, federal and private agencies engaged in such studies. He has served as co-secretary of NFA's Plant Food Research Committee, and has been active on the fertilizer technology subcommittee of the National Joint Committee on Fertilizer Application as well as several other industry groups dealing with chemical control and fertilizer technology. He is well-known in fertilizer industry circles for his efforts in promoting improved fertilizer technology and has authored many articles on fertilizer production and research. He is a member of the American Chemical Society and Phi Lambda Upsilon, Tau Beta Pi, and Sigma Xi societies.

Extra Care Means Better Bags for You

V-C representative discusses customer's new printing plate with V-C engraver. Bag Division representatives work closely with top production personnel to make sure rigid specifications are carefully followed.

Part of a battery of heavy rollers which super-seal pasted bags. Carefully applied fast-drying glue and eight minutes of constant, heavy pressure from these rollers securely bond the surfaces of all pasted V-C bags.

Experienced inspectors carefully examine newly tubed bags before they move on to sewing machines. Careful inspections after every step in the production of V-C Multiwall Bags mean a better package for your product.

V-C Multiwall Bags are made by people who understand the importance of careful construction. It's this extra care in construction that makes V-C multiwalls better for your product. Extra care plus modern bag-making methods, materials and machinery give V-C multiwalls the ability to stand rough treatment while your product is being shipped or stored. Without cost or obligation, ask for full details about better-built V-C Multiwall Bags.

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Carolina-Virginia Pesticide Formulators Hold First Meeting May 3 in Raleigh

A MEETING of the new Carolinas-Virginia Pesticide Formulators Association will be held at the Scandia Village "In the Pines," near Raleigh, N. C., May 3 and 4, it has been announced by J. B. Maddrey, secretary-treasurer, Planters Chemical Corp., Norfolk. Organization of the association was completed January 5, at which time by-laws were adopted and officers and directors elected.

The officers of the association are as follows: president—W. R. Peele, W. R. Peele Co., Raleigh, N. C.; first vice-president—W. P. Crown, Carolina Chemicals, Inc., West Columbia, S. C.; second vice-president—J. Myron Maxwell, Maxwell Insecticide Co., Raleigh, N. C.; and secretary-treasurer—J. B. Maddrey, Planters Chemical Corp., Norfolk, Va. The board of directors include the officers and the following additional members: John J. Diem, Southern Agricultural Insecticides, Inc., Hendersonville, N. C.; John Daly, Daly Herring Co., Kinston, N. C.; W. C. Pickett, Farmers Cooperative Exchange, Inc., Statesville, N. C.; and Ralph S. Tiller, Southern Agricultural Chemicals, Inc., Kingstree, S. C.

Membership in the new group is restricted to persons who are residents of North Carolina, South Carolina or Virginia, and engaged in the business of manufacturing pesticide products. Suppliers of agricultural chemicals to members of the association are eligible for associate membership.

The objects and purposes of the association are set forth as follows in the by-laws:

"To procure and disseminate useful knowledge and information pertaining to the scientific development of agriculture; to advise, assist and cooperate with legislative and regulatory bodies and administrative agencies in procuring progressive legislation and regulation relating to agricultural chemicals; to promote better understanding, cooperation and a high standard of ethics among all persons interested in the improvement of agriculture; to carry on educational and public relations programs to increase the public knowledge, acceptance, and proper use of pesticides; and to foster and promote within the framework of a competitive free enterprise system, the lawful and legal interests of the pesticide industry."

The annual meeting of the group is to be held in November, at which time officers and directors will be elected. In addition to the annual meeting, a mid-year meeting will also be held each year in May, June or July, at a time and place to be fixed by the board of directors.

Charter members of the organization include representatives of the following companies: Apex Chemical Company, Apex, N. C.; Cape Fear Chemical Co., Elizabethtown, N. C.; Carolina Chemicals, Inc., W. Columbia, S. C.; Carter Insecticide Co., Wallace, N. C.; Daly Herring Company, Kinston, N. C.; Farmers Cooperative Exchange, Inc., Statesville, N. C.; Farm Service Company, Wilson, N. C.; Howerton Gowen Co., Roanoke Rapids, N. C.; Graham Chemical Co., Greensboro, N. C.; H & M Chemical Co., Sumter, S. C.; Kirby Chemical Co., Severn, N. C.; Maxwell Insecticide Co., Raleigh, N. C.; W. R. Peele Co., Clayton, N. C.; Planters Chemical Corp., Norfolk, Va.; Southern Agricultural Chemicals, Inc., Kingstree, S. C.; Southern Agricultural Insecticides, Inc., Hendersonville, N. C.

Representatives of the following companies are listed as associate members: Floridin Company, Tallahassee, Fla.; Glendon Pyrophyllite Co., Greensboro, N. C.; Larvacide Products, Inc., New York; Lebanon Chemical Co., Lebanon, Pa.; Prentiss Drug and Chemical Co., New York; Theodore Riedeburg Associates, New York; R. T. Vanderbilt Co., New York.

W. R. Peele
President

•

Dorr Opens New Offices

Dorr-Oliver Inc., Stamford, Conn., announces the relocation of their Chicago office in Merchandise Mart and the opening of a new office in the Midland Building in Cleveland. Staff formerly located in both Chicago and Evanston will be housed in the new Chicago office.

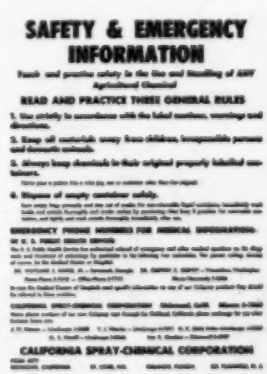
•

Wise, New Spencer Sales Rep.

New Alabama representative for Spencer Chemical Co., Kansas City, Mo., is Ulay K. Wise, a veteran farm service official. He was formerly employed in an agricultural role with the Veterans Administration.

California Spray Chemical Safety Leaflet

A leaflet on safety precautions in the use of agricultural chemicals and disposition of used containers has been prepared for distribution by California Spray-Chemical Corp., Richmond, Calif. The poster emphasizes the need to burn empty bags promptly and suggests that non-returnable liquid containers be washed, punctured and, when possible, buried. The leaflet is illustrated below.



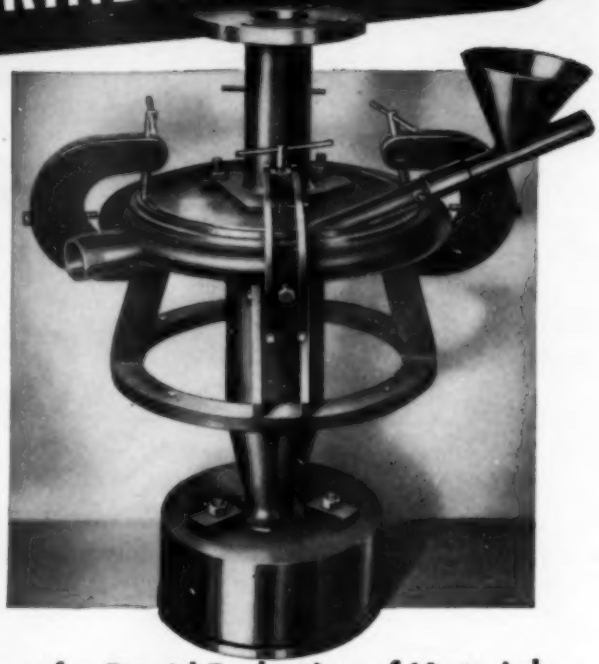
SAFETY & EMERGENCY INFORMATION

READ AND PRACTICE THESE GENERAL RULES

CALIFORNIA SPRAY-CHEMICAL CORPORATION

Sturtevant

MICRONIZER* GRINDING MACHINE



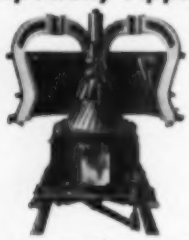
Reduces Solids to Micron Sizes

The new Sturtevant *Micronizer* grinding machine is a fluid jet grinder especially designed to reduce solid materials to particle sizes in the micron ranges.

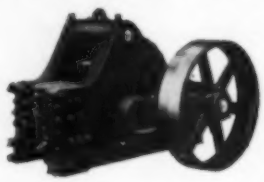
Sturtevant *Micronizers* are used for simultaneous dry grinding and classification of solids. The variety of materials that can be processed is large and includes both metallic and non-metallic minerals and ores, metals, pigments, insecticides, fungicides, pharmaceuticals, plastics, dyes and numerous other organic and inorganic products. Available in capacities from ½ to 3000 pounds per hour.

Other Sturtevant Pulverizing Equipment for Rapid Reduction of Materials...

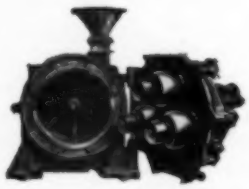
Especially Applicable for Initial Grinding of Products for the Micronizer Mill



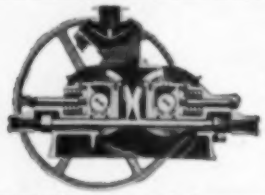
ROTARY FINE CRUSHERS for intermediate and fine reduction (down to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



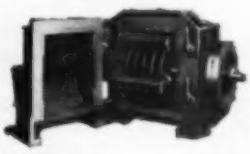
JAW CRUSHERS for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



CRUSHING ROLLS for granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8 x 5 to 38 x 20. The standard for abrasives.



SWING-SLEDGE MILLS for coarse and medium reduction (down to 20 mesh). Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

AIR SEPARATOR for separation of fines to 325 mesh and finer. Increases output from 25% to 300%... lowers power costs by 50%. Capacities ¼ to 50 tons per hour output.

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Decker To Be WACA Speaker

The program for the summer meeting of the Western Agricultural Chemicals Association, to be held

George C. Decker

June 21, 1955 at the Hotel Clark, Los Angeles, will feature Dr. George C. Decker, president of the Entomological Society of America, as luncheon speaker. His subject will be "Integration of Industrial and Governmental Research on Pesticides." Mr. John F. Neace, manager, Marsh Aviation Co., Phoenix, Arizona, will discuss "Package Deals."

Mr. L. S. Hitchner, executive secretary, National Agricultural Chemicals Association, Washington, D. C. will be a guest at the morning business session which starts at 10 A.M. A "get acquainted" social hour, starting at 11:45 A.M. will precede the 12:30 P.M. luncheon. Adjournment is slated for 3 P.M. or earlier, to enable members and guests to reach the Riverside meeting of the Entomological Society of America which opens the next morning.

•

Radiation for Pest Control

The atomic energy department of American Machine & Foundry Co. has announced plans for commercial radiation equipment to kill insects in stored grains and prevent sprouting of potatoes for as long as 15 months.

Although it has been known for some time that radiation can be used for this purpose, AMF Co. says that its designs are the first developed by industry for commercial equipment. W. E. Chamberlain, assistant to the director of AMF's atomic energy department, announced at an atomic energy conference, sponsored in San Francisco by Stanford Research Institute and the Atomic Industrial Forum, that preliminary studies of the equipment give promise of a low-cost, effective and flexible means of controlling grain insects.

•

Fert. Safety Committee to Meet

The executive committee of the fertilizer section of the National Safety Council recently announced program plans for its meeting June 11 at Roanoke, Va. General chairman, Thomas J. Clarke, will give an estimate of the section's progress in respect to organization, national standing and new participants. Mr. Clarke will emphasize participation of fertilizer companies through appointment of personnel to the various committees. Another project to be discussed by Mr. Clarke is an improved reporting system, whereby information pertaining to progress reports may reach the fertilizer plants more rapidly.

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Crystals
Superfine
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Basic Copper Sulphate
✓ 53% Copper as metallic

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Neutral Zinc 56% Zinc as metallic
The Highest Test Nutritional Zinc
If you use Zinc Sulphate be sure to check
✓ Greater Performance and Lower Cost of Zee-N-O

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Neutral Manganese
55% Manganese as metallic
The Highest Test Nutritional Manganese
✓ Greater Performance and Lower Cost
Non-irritating to Workmen

W. R. E. ANDREWS SALES, INC.

NEW ready-to-use weed killer

KILLS GRASS AND WEEDS • KILLS VEGETATION ABOUT FENCE LINES • RAIL SIDINGS • STORAGE AREAS • PARKING LOTS • BUILDINGS

UREABOR*
WEED and GRASS KILLER

LOW RATE OF APPLICATION—
EFFECTIVELY DESTROYS WEEDS AND GRASSES
NOTHING TO MIX—NO WATER TO HAUL
NONCORROSIVE • NONFLAMMABLE
NONSELECTIVE

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Easy to apply!
Just a man and
a pail is all you need!

You get Full Season's Control from One Application!

You'll rid any area of unsightly and fire-hazardous weeds with less effort—less cost—by applying new easy-to-use UREABOR Weed Killer. Only one easy dry application per year can end your weed problems for the season! Yes, UREABOR maintains its activity in the root zone for long periods—destroying existing growth and preventing regrowth. Control may continue for a year, or longer.

FOR DRY APPLICATION—BY HAND OR MECHANICALLY

Because of its granular form, UREABOR Weed Killer is easily broadcast by hand yet works well with all types of mechanical spreaders. And you'll appreciate the low rates of only 1 to 2 lbs. per 100 square feet. However, the fact that there is nothing to mix; no water to haul and, therefore, no costly, heavy equipment to supply, is a most attractive feature. Remember that UREABOR is always ready to use—DRY!

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Calif. Fertilizer Conference

Pesticide-fertilizer mixtures and fertilizer demonstrations on range land were among the subjects reported to the third Annual California Fertilizer Conference, held April 26 at Davis, Calif. Featured during the afternoon session were panel discussions of "Field and Forage Crops," "Vegetable Crops," and "Deciduous and Citrus Fruit Crops."

M. E. McCollam, American Potash Institute, San Jose, Calif., led off the morning meeting with a talk on "Developing Potash Use in California." Later A. George Park, Balfour, Guthrie & Co., Ltd., San Francisco, delivered a progress report on fertilizer demonstrations on range land and Allen B. Lemmon, California Bureau of Chemistry, Sacramento, diccussed pesticide-fertilizer mixtures.

Moderators and participants in the panel groups were: "Field and Forage Crops," John Tollefson, Triangle Co., Salinas, Calif., moderator; W. E. Martin, University of California extension service, Berkeley; W. A. Williams, U.C., Davis; G. D. Manuel, Spreckels Sugar Co., San Francisco; Guy F. MacLeod, Sunland Industries, Fresno; D. S. Mikkelsen, U.C., Davis; and A. George Park.

"Vegetable Crops": Weir Fetters, The Best Fertilizer Co., Stockton, moderator; J. E. Knott, U.C., Davis; Forest Fullmer, American Potash Institute, Newport Beach; O. A. Lorenz, U.C., Davis; John Pryor, John Pryor and Co., Salinas; and Howard Hawkins, Golden State Plant Food Co., Glendora.

"Deciduous and Citrus Fruit Crops": Robert E. Whiting, Swift & Co., Hayward, moderator; E. L. Proebsting, D. G. Aldrich, Jr., Omund Lilleland, and E. F. Serr, all of the University of California at Davis.

Conference members attended a banquet April 26 at El Rancho Hotel, West Sacramento, at which Dr. H. G. Gramlich, former director of agricultural development of the Chicago and North Western Railway System, Chicago, delivered an address titled, "What's Around the Corner." Final event was a joint breakfast meeting, April 27, of the members of the University of California Fertilizer Committee and the Soil Improvement Committee of the California Fertilizer Association. The latter organization sponsors the conference.

Officials of the California Fertilizer Association are B. H. Jones, president; W. E. Snyder, vice president; V. A. Frizzell, secretary, and Jack Baker, treasurer. Millar E. McCollam is chairman of the Soil Improvement Committee.

Nicholson Vice Pres. of Davison

Appointment of F. Clayton Nicholson as vice-president of the Davison Chemical Company Division of W. R. Grace & Co., in charge of chemical operations, was announced recently. Mr. Nicholson's responsibilities include operations at Davison's Curtis Bay Works, Baltimore; Cincinnati Division; Florida Phosphate Division (Bartow), and Lake Charles (La.) Division. He succeeds William B. McCloskey who has been named vice-president of W. R. Grace & Co., in charge of administrative controls.

A complete series of aromatic petroleum naphthas, coal tar naphthas, heavy naphthas, coal tar heavy naphthas, solvent oils and heavy oils. Each solvent is carefully fractionated so that product specifications are closely maintained.

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for control of aphids and mites

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Ninol Reviews Emulsifier Development

PRIOR to World War II most of the insecticides used in the agricultural field were inorganics such as calcium arsenate or botanicals like pyrethrum. These were simply applied as water slurries or oil solutions, and surface active agents were not required except for the occasional use of soap to wet down foliage.

With the introduction of DDT this picture suddenly changed, and an urgent need arose for synthetic emulsifiers to form emulsions of DDT in soft, hard or sea water. As the result of a "crash program" carried out during the war, nonionic surfactants were selected as best suited for the task, and up to about 1950, nonionic emulsifiers were almost the only types used in pesticide formulations.

As newer toxicants like chlordane, toxaphene, parathion and herbicides began to enter the field, it gradually became evident that the simple nonionic emulsifiers were deficient in several respects. For one thing, spontaneity of emulsification was poor, agitation being required to effect complete dispersion. Creaming rates were also undersirably high, the emulsified insecticides separating out quite rapidly on standing. In many cases, rather high concentrations of emulsifier were required, in the order of five to ten per cent, for adequate performance, representing an appreciable fraction of the formulation costs.

During the wartime program at the USDA's Orlando laboratory, a few attempts had been made to investigate anionic emulsifiers such as sodium alkyl aryl sulfonates or lauryl sulfates, as well as blends of these anionics with nonionic emulsifiers, but this line of investigation was not pushed far. About 1948 a few commercial blends of this type were introduced to the trade but still left considerable to be desired.

During the course of an experimental program in the utilization of liquid sulfur trioxide, Ninol Laboratories, Chicago, discovered that certain alkaline earth sulfonates, such as the calciums salt of alkyl benzene sulfonic acids synergized the action of many nonionic emulsifiers. It was found that blended emulsifiers of this type give a great degree of spontaneity even when used in small quantities. These alkaline earth-based emulsifiers also decrease creaming rates, giving emulsions of superior stability, the company states.

Neb. Liquid Fertilizer Plant

Phillips Petroleum Co.'s wholly owned subsidiary, Curry Chemical Co. has announced plans for immediate construction of a 40-ton per day liquid mixed fertilizer plant near its dry fertilizer mixing facilities at Scottsbluff, Neb. The new plant will be equipped to produce liquid fertilizers containing the basic plant foods, nitrogen and phosphate, along with potash when desired. The plant is expected to be in operation by late spring 1955.

Pike's Peak

ABSORBENT CLAY

A SUPER CARRIER
AN OUTSTANDING DILUENT

NOT only will you save on ton prices, but Pike's Peak Clay will help speed up production. Its high degree of absorbency improves grinding and impregnating all toxicants. Pike's Peak's uniformly low moisture and pH of approximately 5 assure you of complete compatibility with a *wide range* of toxicants.

The extremely fine particle sizes provides outstanding flow characteristics before and after impregnation. The standard grind is guaranteed 95% through 325 mesh with a variety of other particle sizes available to meet your specifications.

A trial in your plant will convince you. Write today for complete technical data.

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This year...PLAN SOUNDLY, BUY EARLY, ORDER ENOUGH

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Order from GENERAL CHEMICAL

When you specify "General Chemical" you get the best in basic toxicants for dust mixes and spray concentrates. And you buy from a single, dependable source, with a background of sound research and production experience spanning four decades. So order now, and order enough for the coming year. Call General Chemical today!

TDE (DDD)
Technical, Flake
Dust Base (50% TDE)

DDT
Technical, Flake or Granular
Dust Base, 50% and 75%

BHC
Technical, 15% and 36% gamma
Dust Base, 12% gamma

LINDANE
Technical
Dust Base, 25%, 75%
Emulsifiable Concentrate, 20%
Oil Concentrate, 20%

ORGANIC MITICIDES
Ovex (p-chlorophenyl p-chlorobenzene sulfonate) Technical
"Aramite" Technical

LEAD ARSENATE
Standard
Astringent
Basic

CALCIUM ARSENATE
Standard
Low Lime

PARATHION
Dust Base
Emulsifiable (2 & 4 lbs. per gallon)

FERBAM
Dust Base (76% ferric dimethyldithiocarbamate)

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Dust Base (76% zinc dimethyldithiocarbamate)

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2,4-D WEED KILLERS
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TCA SODIUM SALT
90% Dry Powder
50% Liquid Concentrate

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TVA to Produce Phosphate

The Tennessee Valley Authority announced recently intentions to go ahead with plans for the production and distribution of diammonium phosphate.

TVA reports that the operation does not require a new plant but can be carried out satisfactorily with existing facilities which have been enlarged to produce forty thousand tons annually.

"Under conditions which can now be foreseen," TVA stated, "about 20,000 tons will be produced in fiscal year 1956 for basic agronomic research, farm test-demonstrations and educational sales. This compares with a potential market for commercial production of several hundred thousand tons annually." Production at the outset of fiscal year 1955 will be somewhat under 5,000 tons for all program uses, the agency explained.

Pricing policy, TVA explains, will be based on estimated costs for commercial production, with such reductions from this scale as are necessary to encourage dealers and farmers to use the product.

•

Montrose Reports DDVP Price

Montrose Chemcal Co., Newark, N. J., has established a price of $3.50 per pound for DDVP (dimethyl dichlorovinyl phosphate) to properly-qualified commercial organizations. DDVP, which is being made by Montrose on a pilot plant scale for experimental purposes only, is being supplied in reasonable quantities to the government, universities and similar public institutions at no charge. Montrose reports that the price range of the 100% technical material will be 50-75¢ per lb.

•

Tolerance on Crag Herbicide

The Food and Drug Administration announced recently that tolerances for residues of Crag Herbicide-1 have been established under Public Law 518, the Miller Act. Crag Herbicide-1 (SES) is the first material to be accepted for use under this new law. It is reported that normal residues on the crops for which it is used are so slight that they are harmless. The crops are peanuts, strawberries and asparagus.

•

Vulcan Steel Container Names

Just appointed New York representative for Vulcan Steel Container Co., Birmingham, Alabama, Mr. Donoher started in the container business in 1940. His headquarters office is in Bloomfield, N. J.

Gallowhur Moves to Ossining

Gallowhur Chemical Corp., manufacturer of agricultural and industrial chemicals such as fungicides, herbicides, quarternary ammonium compounds, orchard sprays and slime control chemicals, moved its New York office to the Ossining, N. Y. plant site early in April.

Announced also was the appointment of John H. Holton, Jr., formerly with Niagara Chemical Division, Food Machinery and Chemical Corp., as general manager.

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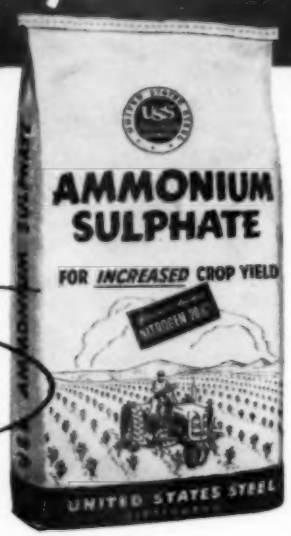
WOVEN WIRE SCREEN
YOURS FOR THE ASKING!
LUDLOW-SAYLOR WIRE CLOTH COMPANY
615 South Newstead Avenue, St. Louis 10, Mo.

TWO BIG summer markets for USS Ammonium Sulphate...

- for sidedressing young corn
- for topdressing pastures



Available in 100 pound bags and bulk

Now is the time to stock up on your USS Ammonium Sulphate for the big corn sidedress demand that will be starting up in just a few weeks. Farmers who have neglected to plow under sufficient nitrogen *must* sidedress to get top yields. Urge them to do it *early* so that the rain will have a chance to carry the nitrogen down into the root zone where it will give best growth results. Avoid root pruning by sidedressing at the first cultivation.

USS Ammonium Sulphate has proved an ideal nitrogen source for corn sidedress because it is so easy to use . . . always dry and free-flowing and less corrosive than similar materials.

Another important summer market for USS Ammonium Sulphate is pasture topdress, after the first grazing. Nitrogen-enriched soils produce heavy yields of high protein grass. And, nitrogen promotes quick regrowth, boosts the carrying capacity of each acre during the season.

For pasture topdress too, USS Ammonium Sulphate is very popular. Its ammonia nitrogen resists leaching yet is available when the plants actually need it. Promote the use of nitrogen for corn sidedress and for pasture topdress this summer. Remember that better yields for farmers mean bigger business for *you*. And for best results from nitrogen, sell USS Ammonium Sulphate.

USS AMMONIUM SULPHATE

UNITED STATES STEEL

Baughman Appoints Hudson

Hugh Hudson, head of Hudson Sales Co., Riverside, Calif., has been appointed sales manager for the West Coast Division of Baughman Manufacturing Co., Inc., Jerseyville, Ill.

Mr. Hudson and three salesmen will service Oregon, Washington, Idaho, Montana, Arizona, Wyoming, Colorado, Utah, Nevada and California—plus British Columbia and Alberta in Canada.

Armour Buyer Retires

Harry C. Moore has retired as director of purchases of Armour Fertilizer Works, Atlanta, Ga., after 47 years of service. Mr. Moore started with the firm in 1907 as assistant chemist in the Atlanta laboratory. In 1926-27, as chief chemist and director of chemical control, he was among the first to begin the commercial ammoniation of superphosphate and fertilizers using ammonical liquor.

AAR Weed Control Project

Chemical control of vegetation along railroad rights of way is the subject of a research project sponsored by the Association of American Railroads, with cooperation from specialists at the state universities of Iowa, Montana and Florida. Some results of this work are reviewed in the third annual report of the Association's Research Center, located at Illinois Institute of Technology.

1954 studies indicate that more applications of chlorate and chlorate mixtures are necessary for control of weeds in Florida than in Iowa or Montana. Best results have been obtained from treatment at an early growth stage. Use of oils from cracking processes is reported "promising," particularly for control of annual weeds.

No fully acceptable non-selective material has been developed for both grain and weeds, perennials and annuals, although several new products show promise on the basis of the past year's work. Some combinations with 2, 4-D (not further specified in the report) are also giving favorable results. According to the report, "the phenyl urea compounds are expensive and have produced extremely variable results, from complete control with 10 lbs. per acre, to very poor control at 60 lbs. per acre. Their use this year as additives to other chemicals, however, shows good results experimentally. Borax compounds give good results and carry over when used in sufficient amounts—3,000 to 4,000 lbs. of commercial ore per acre. Weather conditions have been found important but have not been fully evaluated.

Find Potash Patent

The first patent known to have been issued by the United States, a long-lost document describing an improvement in potash making, was recently discovered in a trunk of papers given to the Chicago Historical Society about a year ago. The patent, signed by George Washington and Thomas Jefferson, is now on display at the Commerce Department, Washington, D. C.

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YOU CAN BUY IS A . . .

VISIBLE

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For any application . . . in storage facilities for LP-Gas or Ammonia, domestic or commercial . . . there's a "Visible" Float Gauge!

And of course, it's the very finest in quality of craftsmanship and materials . . . precision made . . . accurately calibrated . . . thoroughly tested!

Write today for details and prices on the gauge best suited to your needs . . . you'll find it in the "Visible" Line.

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Fert. Section Names Officers

William H. Stone, Wilson & Toomer, Jacksonville, Fla., was elected chairman at the recent meeting of the fertilizer section of the Southern Safety Conference held in New Orleans, La. Other officials elected were S. Lee, Cotton Producers Assoc., Atlanta, vice-chairman, and M. J. Hattier, Cotton Oil Co., New Orleans, recorder.

Some of the reports presented at the meeting were "Workable Small Plant Safety Program," Harold R. Krueger, Snyder Chemical Co., Topeka, Kan., and "Handling Ammonia Solutions Safely," Charles L. McDaniel, Lion Oil Co., El Dorado, Ark.

•

NFU To Mine N.M. Potash

A contract for joint development of potash reserves owned by the National Farmers Union in southeast New Mexico was signed with Kerr-McGee Oil Industries, Inc. last month, NFU announced. The agreement reportedly calls for Kerr-McGee to sink the first mine shaft near Artesia, N. M. James G. Patton, president of NFU, predicted that the properties "will be in the commercial production of potash by 1956."

•

Chem. Exposition Scheduled

The 25th Exposition of Chemical Industries will be held at the Commercial Museum and Convention Hall, Philadelphia, Dec. 5-9, according to a recent announcement by International Exposition Co., New York, managers of the event. The exposition will cover application of chemistry and chemical engineering to industry with emphasis on products and techniques discovered during the two years since the last exposition was held. As of this writing, more than three hundred applications for space have been received.

•

NFA Issues Sampling Methods

A summary of sampling methods employed by state fertilizer control officials has been compiled by the Chemical Control Section Plant Food Research Committee, NFA, and issued as a bulletin to NFA members. The report reviews catalogue methods presently used to sample bagged fertilizer and points out differences in sampling methods employed by state agencies.

•

Forestry Assoc. Plans Awards

The Awards Committee of The American Forestry Association is now receiving nominations for the annual Conservation Awards. Members of the Committee are: Lowell Besley, AFA; Rep. Watkins M. Abbitt, (D-Va.); M. D. Mobley, American Vocational Association, Inc.; Robert N. Hoskins, Industrial Seaboard Air Line Railroad; Bryce C. Browning, Muskingum Watershed Conservancy District; Arthur R. Spillers, U. S. Forest Service; Louis H. Wilson, Secretary and Director of Information, American Plant Food Council.

The awards presentations will be made at Jacksonville, Florida, October 5, in conjunction with the 1955 annual meeting of the Association in that city.

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'54 Corn Borer Losses Up

Almost 192 million bushels of grain corn worth more than $261 million—about 7 per cent of the national crop—were destroyed by the European corn borer in 1954, according to an estimate by the U.S. Deptment of Agriculture. This is more than double 1953's estimated 3 per cent loss of 90 million bushels worth more than $125 million. Last year's losses have been topped only once, in 1949, when corn destroyed by the borer was estimated at almost 314 million bushels worth nearly $350 million. Iowa, Illinois, Nebraska, and South Dakota suffered heaviest losses to the insect.

•

Safety Award to Am. Potash

American Potash & Chemical Corp., Los Angeles, has been presented an award of honor by the National Safety Council for the company's safety record set during 1954. This is the Council's highest award. The 1954 accident rate was the lowest in the company's history and was 89 per cent lower than the Safety Council's so-called "par accident rate."

•

Oldbury Construction in Miss.

Earl L. Whitford, president of Oldbury Electro-Chemical Co., announced recently that the company will soon start construction of an addition to the Mississippi Works. Plans have been completed for the expansion of sodium chlorate production facilities, and the actual construction is scheduled to start next month. Oldbury produces sodium chlorate at Niagara Falls, as well as at Columbus, Miss.

•

Wisconsin Alumni Campaign

The Wisconsin Alumni Research Foundation, Madison, Wisc., reports continued success in its fourth annual Rat and Mouse Control Achievement Award Campaign, initiated in the late fall of 1954. As of the latest report, there are 1,882 clubs enrolled in the current campaign as compared with 1,409 for last year.

It has been suggested that one reason for increased interest in rodent control is the Food and Drug Administration's intensified enforcement of its grain sanitation program, whereby unclean grain is downgraded to feed classification.

•

Pacific C. Names Canadian Rep.

Pacific Coast Borax Co., Los Angeles, recently named the agricultural chemicals department of Canadian Industries Ltd. as eastern Canadian distributor for its agricultural chemicals products, including two non selective weed killers and soil sterilants: poly-bor-chlorate and concentrated Borascu (sodium borate).

'54 Potash Deliveries Up 9%

Deliveries of potash in North America during 1954 amounted to 3,522,213 tons of salts containing an equivalent of 2,059,643 tons K_2O, again a new record high according to the American Potash Institute. This was an increase of 178,259 tons K_2O or 9% over 1953. Deliveries by the seven leading domestic producers were 1,909,255 tons K_2O, an increase of 11% over last year. Imports were 150,388 tons K_2O, a 5% decrease under last year.

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Report SO_2 Pollution Study

A pilot plant study of the use of ammonia for removal of sulfur dioxide from flue gases was reported by H. E. Newall, Fuel Research Station of England, at the first International Congress on Air Pollution held recently in New York. The pilot scrubs the flue gas with a concentrated solution of ammonium sulfate, sulfite, bisulfite and thiosulfate. Removal efficiencies reported were 80% with a single-stage process and 95% with a two-stage process. Sulfur is recovered in the form of ammonium sulfate and elemental sulfur.

•

Progress of S. C. Studies

South Carolina was among the early users of insecticide-fertilizer mixtures according to a progress report given in the Insect and Plant Disease Notes prepared by researchers of the Clemson Extension Entomology and Plant Disease Work.

The researchers point out that since 1948, when insecticides were first used to control the sand wireworm, there has been considerable expansion of the use of insecticide-fertilizer mixtures. Combined totals of surveys made annually show that more than ½ million acres of crop land have been satisfactorily treated with insecticide-fertilizer mixtures. Usage reached a high point in 1954 when over 108,000 acres were treated.

However, all soil insect control has not been effected by means of insecticide-fertilizer mixtures or by seed treatments. A large amount of granular insecticides has been applied, especially to control the white-fringed beetle, as a part of federal-state programs directed by the Crop Pest Commission of Clemson College. Insecticide dusts and sprays are also being used. For example, parathion is being used on tobacco plant beds as a dust, spray, and drench to control white grubs.

The surveys show that insecticide-fertilizer mixtures have been used on the following crops and acreages to control the pests listed: Corn, approximately 100,000 acres, to control sand wireworm, southern corn rootworm, and seed corn maggot; Irish potatoes, more than 5,000 acres, to control wireworms; sweetpotatoes, 1,000 acres, wireworms and elongate flea beetles; snap beans, 1,000 acres, seed corn maggot; cotton, acreage unknown, sand wireworm; and pastures, 1,200 acres, white grubs.

The surveys also show that these mixtures have proved effective in the coastal trucking area to control mole crickets, but the acreage is not known. Their use on lawns to control white grubs is increasing, and apparently when the grubs are killed ground moles tend to go to other areas.

Phosphate Plant for S. Africa

A recently constructed phosphate plant in the northeastern Transvaal, Union of S. Africa, is expected to be in operation sometime during April. Heretofore South Africa has had to rely entirely on imports for its supply of phosphate, but the new facility is expected to supply about 1/6 of the nation's needs. The Phosphates Development Corp., Ltd., Johannesburg, S. Africa, will own and operate the plant. All phosphate will be processed into super-phosphate fertilizers.

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What's Wrong With The Distributor-Dealer Program?—

By W. H. Prigmore
Eastern States Farmers' Exchange
Springfield, Mass.

EASTERN States Farmers' Exchange, second largest cooperative in the pesticide field, showed a 22 per cent boost from 1953 and reaffirms the value of a well-integrated distributor-dealer program.

A growing movement on the part of manufacturers of agricultural chemicals to by-pass the distributor, formulator, and dealer, selling and promoting directly to the farmer, has contributed to a demoralized situation in the pesticide field. Some manufacturers feel that the distributor-dealer arrangement is out-moded and that a more direct to the grower program is the answer for modern merchandising. It is true that in many instances the D-D (distributor-dealer) system could be vastly improved and made an effective force in selling America's farmers.

What's Wrong With the D-D System?

Manufacturers have huge investments in research and production facilities, spend great quantities of money for technical development, patent work, pilot plant trials, etc.; All of this is to no avail and even presents some hazards unless the product is handled intelligently at the user level.

Are the distributors adequate for the job? Prior to World War II, the distribution system in New England took care of all products in the agricultural chemicals field very handily. However, with the advent of the new insecticides like DDT, after the war, many new manufacturers came into the business and it was impossible for the distributors to keep all the manufacturers happy. The first year that DDT was out, we had 16 suppliers approach us. There were only about six recognized distributors in New England at the time. Those who could not work through established distributors had to find other ways to market their product. It was only natural that dealers became distributors and large growers became dealers of the new distributors.

It is easy for any farmer to become a dealer. In other lines of business, it is customary to have a "place of business"; salesmen, inventory, records, etc. But it is only necessary to be a grower in the community, use the products and stock a little extra in the barn for neighbors to buy, in order to be a dealer in agricultural chemicals! Probably the farmer has no investment in the stock he is holding—obviously a poor situation.

Where usage of a few products is large and variety of crops is extremely limited, the direct sale of manufacturer to farmer may prove economically sound.. However, especially in the Northeast, the reverse sit-

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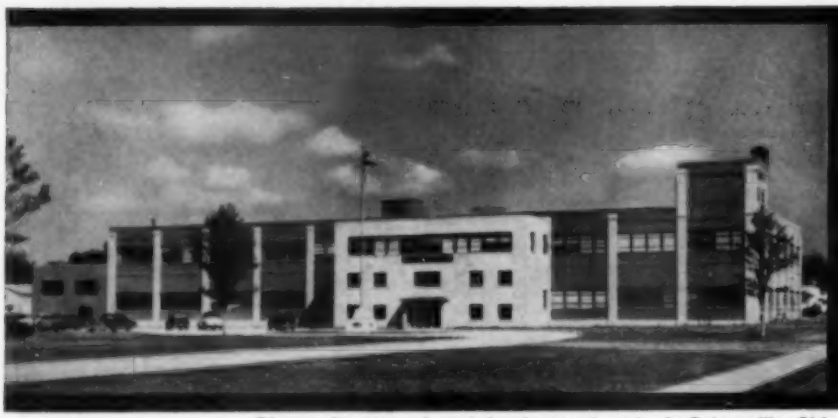

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- Seed Disinfectant
- 2,4-D Weed Killers
- 2,4,5-T Brush Killers
- Grain Fumigants
- Wettable powders, emulsifiable and oil solutions; and dust concentrates based on our technical grade chemicals

and many other chemicals that help farmers, gardeners, cattlemen and orchardists.

uation is true; many small users and diversified crops make a continuing contact by manufacturer definitely prohibitive. The cost of each individual sale would be sky high.

What Eastern States Has Done

(a) During the growing season, ESFE maintains basic inventories exceeding ¾ million dollars in three central plants serving a nine state area. The inventories are not on consignment and include products of 25 different manufacturers. These are backed up by point-of-sale inventories at 83 points in the area and these stations are within easy reach of the 450 farmer-representatives serving ESFE as the equivalent of local "dealers."

(b) Forty-two trained field men representing ESFE are each responsible for specified territories in the nine-state area. These men have been trained by a full-time staff at the main office in West Springfield, including an entomologist, plant pathologist, and two specialists on pesticides. A series of meetings held "in the orchard" and inside throughout the year keep ESFE local Reps (dealers to you) briefed on the latest usage information. A manual containing "meaty" pages of data on new products for the coming season is given to representatives at a special all-day session with the experts from the home office to insure a good understanding of the new products.

(c) Two monthly magazines prepared by the Information Service, a Representative and a member publication, plus "How-to-Do-It" pamphlets and small booklets on Field Crops, Fruits, Pest Control, Vegetables, and others present the farmer with good basic information on proper usage of the products he is buying.

(d) We do not expect manufacturers who supply us with inventory to do our selling for us. We do not encourage or accept sales help at the grower level. Advertising allowances are not requested. All our booklets and promotional material are prepared at our own expense.

(e) Our men can effectively handle the distribution of pesticides since they call on the farmer for feed, seed, fertilizer, and farm supplies. We are vitally interested in the proper use of these pesticides since it means better crops, better production and a satisfied member for fertilizer, seed, feed, and other items. Good milk yield means fly control; a good stand of alfalfa means forage crop control; and good crops through proper fertilizer usage means weed control. It is essential to the success of the overall Eastern States program for the farmer to get the maximum value from his agricultural chemicals.

The situation wherein organizations like Eastern States supply all the services and find themselves competing with dealers who offer none is untenable. Manufacturers must, and I think will, reaffirm their faith in an effective, well coordinated dealer-distributor setup for merchandising their products.★★

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SUPERFINE (snow), SMALL or LARGE CRYSTALS, all containing 25.2% metallic copper.

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PHELPS DODGE REFINING CORPORATION — NICHOLS — TRIANGLE BRAND — CHEMICALS — 40 WALL ST. NEW YORK

N.C. E.S.A Names H. Gunderson as New Chairman for 1955

Top Photo: Staff members of the Dept. of Entomology of Michigan State College, acting as hosts for the meeting, are gathered before a large cake which symbolizes the centennial year of the college.

Bottom Photo: Members of the new executive commitee (L to R): Back row, H. O. Deay, Purdue University; R. E. Hill, University of Nebraska; H. M. Harris, Iowa State College; J. W. Apple, University of Wisconsin. Front row, R. W. Rings, Ohio Agricultural Experiment Station; Harold Gunderson, extension entomologist in Iowa; and C. M. Mickel, head, University of Minnesota.

WITH the final day for filing residue petitions approaching rapidly, members of the North Central Branch, ESA, were particularly interested in a report on the calculation of tolerances of mixed chemical residues on fruits and vegetables, which was presented by J. E. Fahey, USDA, Vincennes, Ind., at the tenth annual conference of the group, held March 24-25th at Michigan State College, East Lansing, Michigan. Mr. Fahey pointed out that:

1. If chemicals of a mixed residue are unrelated chemically, and do not cause related pharmacological effects, then the tolerance for each chemical present in the mixture must be considered separately.

2. If the chemicals of a mixed residue have a common component, which causes related pharmacological effects, then the residues are considered to be additive, and the amount of the common component is limited.

3. Where the chemicals of a mixed residue are in the same class, (chlorinated hydrocarbons or organic phosphates) the tolerance for the residue shall be the same as that for the chemical having the lowest tolerance.

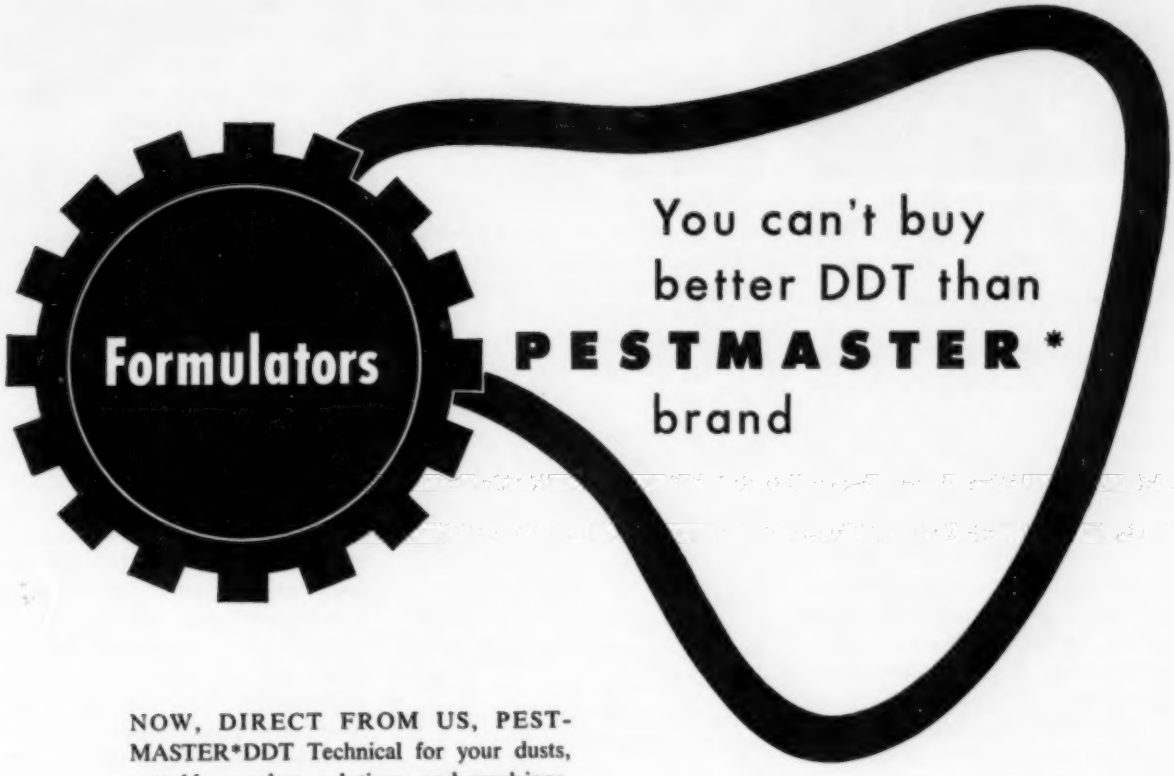
With this basis for consideration of all insecticides, ESA members proceeded to compare notes on recent and current data concerning pest control on fruits, vegetables, cereal crops, forage crops, etc.

In considering new insecticidal developments, C. C. Alexander, Geigy Agricultural Chemicals, Bayonne, N. J., indicated that "probably fewer new insecticides will make their appearance during the next ten years. The emphasis," he said, "will be on less toxic materials, and the organic phosphates appear to offer promise in this field. There are indications that much more work will be done in the field of systemic insecticides," he continued.

According to Dr. Alexander, "the lack of great numbers of new insecticides is certainly not a discouraging picture. There a wide range of effective compounds now available. Rather than always looking for a new insecticide when a problem arises, attempts should be made to find means of applying insecticides now in use."

Forecasting future developments in the field of stored grain fumigants, Dr. H. H. Walkden, USDA, Manhattan, Kans., advised that the trend would appear to be: (1) increased use of aerating systems for forced circulation of fumigant vapors; (2) a re-evaluation of many compounds to establish their usefulness in forced circulation systems; and (3) the decreased use of fumigants due to the widespread adoption of preventive measures such as protective dusts and sprays applied directly to the grain at harvest or binning time.

Top Left: R. H. Nelson, executive secretary of the ESA, and F. W. Poos, editor of the "Journal of Economic Entomology."
Top right: W. P. Hayes, University of Illinois, and Herman King, Michigan State College.
Bottom Left: Marshall Magner, Monsanto Chemical Co., and C. R. Weaver, Ohio Agricultural Experiment Station, members of the program committee.
Bottom Right: E. H. Fisher, University of Wisconsin; Dean Floyd Andre, Iowa State College; and W. G. Lovely, U.S.D.A.



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Earl Raun, Iowa State College; R. H. Nelson, Washington, D. C.; G. C. Decker, president of the ESA; and A. W. Lindquist, Beltsville.

Vegetable, Legume, Cereal Insects

NORMAN Gannon, discussing control of armyworms and chinch bugs, reported that when toxaphene is used at 1 to 2 lbs. per acre, dieldrin at .25 lbs., and endrin at .15 to .2 lbs., satisfactory control of the armyworm is obtained . . . but that parathion and BHC give only poor to fair control. Endrin and dieldrin also control chinch bugs.

An important factor in control of the clover seed weevil, reports A. G. Peterson, Univ. of Minnesota, is the timing of application of insecticide. DDT at 1½ to 2 lbs. has been most effective for control of this pest. Also good results are obtained with dieldrin at ¼ lb. per acre, and heptachlor at ½ lb. per acre.

Parathion and malathion are the most commonly recommended materials for aphid control in potatoes, reports G. E. Guyer, Michigan State College. Other effective materials are systox, TEPP, metacide and nicotine sulfate. Wireworms, he advises may be controlled by aldrin . . . other satisfactory materials include heptachlor, chlordane, dieldrin and DDT. Dr. Guyer reports too that although endrin does not have federal approval for use on potatoes at this time, it will control most of the important potato insects, including aphids.

R. A. Blanchard, USDA, indicates that "apparently no new methods for control of corn earworm applicable to conditions in the North Central States have been worked out." From 2-4 applications of a DDT oil-emulsion spray at the rate of 1.5 to 2 pounds of DDT still appears to give the best results.

Stewart's disease in sweet corn, reports W. H. Luckman, Illinois Natural History Survey, may be reduced with dieldrin. Dosages of 1¼ pounds and higher are suggested.

Effective insecticides for the control of corn rootworms, advises J. H. Lilly, Iowa State College, include aldrin, heptachlor, dieldrin, BHC, endrin, chlordane, and lindane. Insecticide-fertilizer mixtures used as starter fertilizers have been popular, he says, because low dosages are used, and no extra work or equipment is required. Spray applications made with ordinary farm sprayers appeal to other farmers, and some early tests indicate they may give control for two years.

C. C. Burkhardt, Kansas Agricultural Experiment Station, Manhattan, in an address at the cereal crop sessions, pointed out that the band treatment, at time of planting, with a material such as aldrin or heptachlor is the most effective and economical method of chemical control of the western corn rootworm in Kansas, where most of the corn is listed rather than surface planted. He cautions, however that in several tests, lindane had an adverse effect on germination.

In Nebraska, advises H. J. Ball, Univ. of Nebraska, aldrin, BHC and heptachlor are currently recommended for rootworm control. Aldrin and heptachlor are recommended at ½ pound per acre for either spray or fertilizer applications. BHC is not recommended as a row treatment.

Fruit Pests

IN a discussion on developments in codling moth control, D. W. Hamilton, USDA, Vincennes, Ind., reported that during the past ten years, DDT has been the material most generally used; "Methoxychlor," he said, is less effective than DDT; and TDE, although less effective than DDT has been included in N. Y. state recommendations, where codling moth activity is light and red-banded leaf rollers are active; parathion, he indicated, has been recommended by most states as a control, but its place in the spray program is still controversial. Malathion deposits are less persistent than those of parathion, while diazinon has maintained better control of codling moth than DDT in some experimental plots. Still another new compound, pirazinon, which is closely related to diazinon, is also similar to diazinon in extent of control of codling moth . . . however, it will not be available for testing in 1955."

The problems of peach catfacing were considered by S. C. Chandler, Illinois Natural History Survey, who indicated that plum curculio and several species of stink bugs are responsible for most if not all of this injury. Dieldrin, DDT, and parathion, in descending order, control this injury to peaches.

Fly Control & Systemic Agents

THE possibility of phenothiazine as a systemic against cattle grubs has been under study for some time, reports W. M. Rogoff, who also advised that a mixture of phenothiazine, hexachlorethane and an organic tin compound is marketed in England under the trade name "Hypolin." Encouraging results with the compound have been obtained and it is considered quite likely that several years from now we may see cattle grubs being controlled by chemical agents introduced into the hosts and producing their effects on larvae before they reach the backs of cattle.

In a report on "Fly control with several organic thiophosphate insecticides," P. A. Dahm and E. S. Raun advise that of the following group of compounds tested, diazionon appeared to kill stable files most effectively: isochlorthion (American Cyanamid 4124), chlorthion, (Bayer 22/190), diazinon, Pention-80, and pirazinon.

Mickel, Chairman Elect

SOME 350 registrants participated in the conference, and members elected Dr. Harold Gunderson, Iowa State College, as 1955 chairman, to succeed Dr. T. C. Allen, University of Wisconsin. C. M. Mickel, University of Minnesota was named chairman elect, and will assume chairmanship in 1956, when the annual meeting will be held at Purdue University, Lafayette, Ind.★★

THE O. W. KROMER CO., North, Minneapolis, announced recently the appointment of Harry S. Fuller as sales engineer for eastern U. S.

NEWS Brevities

NICKLES SPRAY SERVICE, INC., has been incorporated at Frankfort, Ky., by Charles E. Nickles for spray applications on crops and shrubbery, landscape gardening and tree surgery.

* * *

CANADIAN INDUSTRIES 1954, LTD., is asking for tenders by invitation for construction of an ammonia plant at Millhaven, Ont. Present plans call for an annual capacity of 30,000 - 35,000 tons.

* * *

A $2,500,000 CHLORINE AND CAUSTIC SODA PLANT is under construction by Electrochemical Industries (Frutarom) Ltd., near Haifa, Israel.

* * *

"LARVACOVERS," a new type of vinyl plastic soil cover, has been announced by Larvacide Products, Inc., New York. The manufacturers claim the product is highly durable because of a florist green tint which increases resistance to deterioration from sunlight and use of heavy duty, 8 gauge plastic.

* * *

WILLIAM B. MCCLOSKEY has been elected vice president in charge of the Administrative Controls Division of W. R. Grace & Co., New York. Mr. McCloskey's last position was as vice president in charge of chemical operations of the company's Davison Chemical Co. division.

* * *

OLIN MATHIESON CHEMICAL CORP., New York, has reported earnings of $34,292,000 during 1954, an improvement of nearly 14 percent over 1953.

* * *

THE 9TH NATIONAL CHEMICAL EXPOSITION will be held in Cleveland, Ohio, November 27-30.

GREENMONT LIQUID FERTILIZER CO., Inc., has been chartered at Montgomery, Ala.

* * *

CONSTRUCTION OF A NEW 66,000 TONS-A-YEAR AMMONIA PLANT for Canadian Industries (1954) Ltd. will get under way by mid-year at Millhaven, Ont., near Kingston. Cost is estimated at $6-7 million. Bunker fuel oil is expected to be the basic raw material in ammonia manufacture.

* * *

CLIMAX MOLYBDENUM CO., New York, announced recently an expansion program. The reorganization entails the creation of three new domestic divisions including direct sales, metallurgical market development and chemical market development.

* * *

THE GRASSELLI CHEMICALS DEPT., of DuPont Co. has put into operation in Chicago, what it claims to be the world's largest single unit for production of sulfuric acid.

* * *

PHILLIPS CHEMICALS CO. has commenced shipment of anhydrous ammonia — utilizing barges equipped with special pressure tanks — from its Adams Terminal, Houston to Ochoa Fertilizer Corp.'s plants at Guanica, Puerto Rico.

* * *

EARNINGS REPORTED BY DIAMOND ALKALI CO., Cleveland, for the first quarter of 1955 were $1,632,905, or 66¢ per share as compared with a net profit of $1,365,116, or 54¢ per share in the same period of 1954.

* * *

ROY E. WILSON of Orlando, recently was appointed resident sales and service representative for the Pennsylvania Salt Manufacturing Co. in Orlando, Fla.

BAUMLANDER HORTICULTURAL RESEARCH LABORATORY, Croton, N. Y., recently added Mrs. I. F. Bases and G. J. Pfundstein to its staff. The laboratory was organized in 1953 for specialized services to manufacturers of agricultural chemicals and equipment materials, advertising agencies, nurserymen and horticultural organizations.

* * *

ROHM & HAAS CO., Philadelphia, received two safety awards at the annual Regional Safety and Fire Conference luncheon, Broadwood Hotel, Philadelphia, March 9. The awards honored the company's Bridesburg plant as the winner of the 1954 interplant safety contest, in which 161 manufacturing plants in the Philadelphia area had competed.

* * *

UNION BAG & PAPER CORP., New York, has announced appointment of John Hordych as manager of the company's packaging service department.

Mr. Hordych joined Union in 1948 and has served in the packaging services department since that time.

* * *

THE SOHIO CHEMICAL CO., has been formed by The Standard Oil Co. of Ohio for marketing products of the $17,000,000 petrochemical plant now under construction at Lima, Ohio. The new plant should be in operation early this November, producing anhydrous ammonia, urea, nitric acid and nitrogen solutions.

* * *

AT THE FERTILIZER SECTION Southern Safety Conference in New Orleans on February 28, the Geiger Safety Award was presented to the Gretna, Louisiana plant of the Davison Chemical Company, Division of W. R. Grace & Co.

* * *

VINCENT SAUCHELLI, Davison Chemical Co., Baltimore, acted as seminar leader of a discussion on "Phosphorus in Agriculture" held April 29th at the University of Delaware. Dr. Sauchelli's remarks dealt with the use of phosphorus in fertilizers.

Suppliers' BULLETINS

Announce Space Fumigant

Eston Chemicals Division, American Potash and Chemical Corp., Los Angeles, and Ferguson Fumigants, Inc., Ferguson, Mo., have jointly announced their new folder on "Bromotox," a new space fumigant composition. It is a mixture of methyl bromide and ethylene dibromide that is under pressure in the container and is applied in the same manner as commonly practiced with methyl bromide alone.

The product is claimed to be synergistic, and completely effective at dosages 25% or more below that commonly used for methyl bromide. The product has a strong odor which is valuable in safe application by permitting the fumigator to easily detect the fumigant in very low concentrations. No odor residue has been experienced in test fumigations of a wide variety of food products. The fumigant is non-flammable.

•

Seed Treatment Adapter

A slurry adapter was announced late last month by Panogen, Inc., Chicago, makers of the liquid seed disinfectant of that name.

Company officials say the adapter permits a quick change-over from the liquid method of treating wheat and other grains to use of slurry, or a semi-solid mixture. It is said to be the first machine combining the two methods in this way.

•

New Liquid Fertilizer Pump

The University of Tennessee reports the invention of a new type pump for application of liquid fertilizers. The new pump uses a plastic hose and may be used for applying both low pressure and non pressure solutions.

•

Issue Chemical Weed Guide

The 1955 G. L. F. Chemical Weed Control Guide, a condensation of the most recent recommendations for specific weed problems and crops, has been published by the Soil Building Division, Cooperative G. L. F. Exchange, Inc., Ithaca, N. Y.

The bulletin reviews control of wild onion, garlic, winter wheat, pastures, horsenettle, canada thistle, bedstraw, milkweed, poison ivy and aquatic weeds. It also reviews soil sterilization and provides instructions in the use of weed killers and equipment.

•

New Kraft Filling Machine

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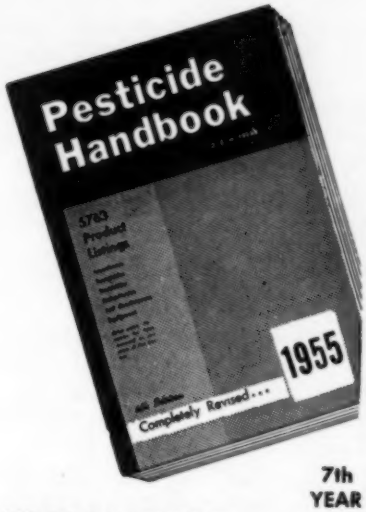

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about the editor—

Dr. Donald E. H. Frear, Editor of PESTICIDE HANDBOOK 1955, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition, he has written several other books, including "Chemistry of Insecticides, Fungicides, and Herbicides." Dr. Frear is Professor of Agricultural and Biological Chemistry at The Pennsylvania State University.

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•

DuPont Markets New Chemical

"Delsan," a new seed treating chemical containing dieldrin to control soil insects, and "Arasan" to combat soil fungi and plant diseases has been put on the market by DuPont & Co. The pesticide is recommended for treating beans, including lima beans; seed corn (field and sweet); and pea seed.

•

New Antara Catalog

Antara Chemicals, a sales division of General Aniline & Film Corporation, New York, has just published a second edition of its catalogue of products. A new section has been added to the revised edition, listing the items handled by Antara's Special Product Sales Department. They are shown under their chemical abstract and their common names.

•

Pamphlet on Crag Herbicide

Crag Herbicide-1, the new weed preventer that kills weed seeds as they sprout in peanut crops, is the subject of a six-page pamphlet just released by Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp. Crag Herbicide-1 is not an active weed killer when first applied. It must first unite with the bacteria in the soil where it is converted into a weed seed killer. The new pamphlet explains how Crag Herbicide-1 prevents weeds in peanut fields in this manner and answers many other questions that peanut growers might ask concerning the use of proper equipment, and the methods and dates of application.

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Device for Soil Measurement

Industrial Instruments, Inc. Cedar Grove, N. J., reports continued high sales of its portable conductivity bridge which is used, in conjunction with a soil cup made of molded "Zytel" nylon resin, manufactured by Industrial Devices, Inc., Edgewater, N. J., for the measurement of soil fertilizer content.

•

Phygon for Mint Rust

Mint rust can be prevented with Phygon Mint Dust, according to a recent report from the Naugatuck Chemical division, United States Rubber Co. The compound is applied to the mint four to six times during the growing season and virtually eliminates rust without leaving a residue in the mint oil.

•

Acme Announces Mask Kit

Acme Protection Equipment Co., South Haven, Mich. is marketing a gas mask kit designed for protection of millwrights and maintenance men against plant hazards. The equipment provides a full-vision face piece for dust and smoke protection, a canister mask for gas hazards and an air-supplied mask for use in any harmful or objectionable atmosphere.

•

Victor Promotes Tank Spraying

Use of fuel tank trucks, which are normally idle during the slack summer months, for spraying of agricultural chemicals is being promoted by Victor Chemical Works, Chicago.

Victor has prepared a booklet which will enable fuel oil jobbers to do their own formulating of fertilizers, thus making it possible for them to buy their supplies directly from basic manufacturers. The plan should be tempting to these jobbers since they already have a good prospect list in their regular fuel customers and this activity would afford them a profitable enterprise during a time of the year when their trucks are generally inactive.

New Carbide Technical Buln.

Aminoethyl ethanolamine is described in a four-page technical bulletin just issued by Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp., New York. Information is given on properties, specifications, shipping container contents, safe handling practices, applications, and selected references. This reactive chemical is used in the production of insecticides and sequestering agents. It is of particular interest as a raw material for cationic surface-active agents. These products are emulsion breakers; oil-soluble wetting agents.

•

Meters for Liquid Fertilizers

A new line of all-ferrous Rotocycle meters, designed for metering low pressure liquid fertilizers such as aqueous ammonia and ammonium phosphate has been introduced by Rockwell Manufacturing Co., Pittsburgh.

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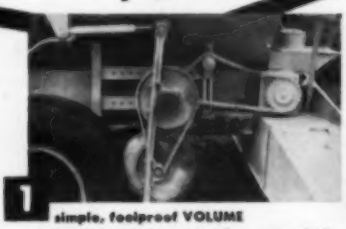

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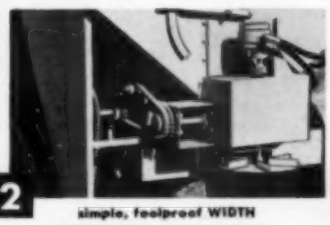

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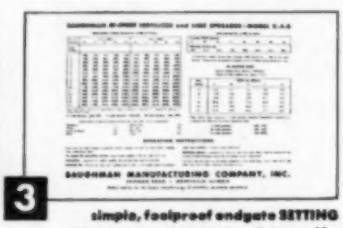

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RESIDUE TOLERANCES

(*From Page 49*)

Growers Need Clarification

BUSY farmers have many tasks facing them besides pest control. It behooves the representatives of the state colleges, the federal government and industry dealing with farmers and the dealers who supply them with pesticides, to inform the growers of the necessity for using only those chemicals which have met the requirements of the new legislation, and to use them in schedules which will permit the residues to meet any tolerances set on the harvested crops.

FDA Responsibilities

A DEFINITE responsibility for enforcement of tolerances by the Food and Drug Administration is included in the Miller Bill. Also, raw agricultural commodities may be seized if they have residues in or on them of pesticides for which tolerances have not been set, or which have not been exempted from tolerances. Before registration can be accepted under the current legislation, the tolerance or exemption of the pesticide must be established, hence it is more essential than ever before that a grower read the label to be certain that the product he plans to apply to his crop will not endanger the sale of his produce after it is ready to market.

A careful grower will want to know that in addition to using a pesticide that has met the requirements of federal legislation, his proposed use program will give him reasonable assurance of being able to meet the residue tolerance requirements.

Food Processors Concerned

PROCESSORS of food commodities must meet the tolerances set for a given pesticide on the raw commodity after following the best manufacturing procedures that may tend to reduce any residues present on the raw product. In other words, they should use every practical device possible to reduce residue loads to the minimum during processing, and if these practices are followed and the processed product meets the tolerance levels set for the raw product, they should not be in any difficulty.

Tolerances May be Reviewed

IN keeping with the necessity for considering new progress in research, provision is made under the Miller Bill for an interested party to petition the Food and Drug Administration for a new tolerance level on a pesticide for which a tolerance has already been established. This procedure is important inasmuch as many companies after extensive research in their own laboratories and in cooperation with state and federal stations may feel justified in asking for consideration of their new data in relation to new tolerance levels.

Regulations on Buildup of Residues

PROCEDURES have been established for the determination of residues of a particular class of pesticides, i.e., chlorinated hydrocarbons, phosphate chemicals, arsenicals and the like. When residues are present from two or more pesticides of the same class, they will be subject to definite limitations to avoid a buildup of residues beyond a safe limit. The regulations governing the procedures to follow are included in the rules and regulations published in the Federal Register of March 11, 1955.

Responsibility for Pest Control

THE new Section 408 of the Food, Drug and Cosmetic Act, establishes the procedure for prompt establishment of, or exemption from, tolerances for pesticides once they have undergone the necessary program of evaluation. As such, it fills a need that has long been felt. With information available on tolerances, the grower, the research and extension services of government and industry must be alert to meeting the regulations. Commodities showing objectionable residues for one reason or another will be subject to seizure and removal from the market. Farmers must take care to follow directions on the label and not double up on dosages or make late applications too near to harvest. With the joint effort of all concerned, we should be able to meet the requirements that are established.★★

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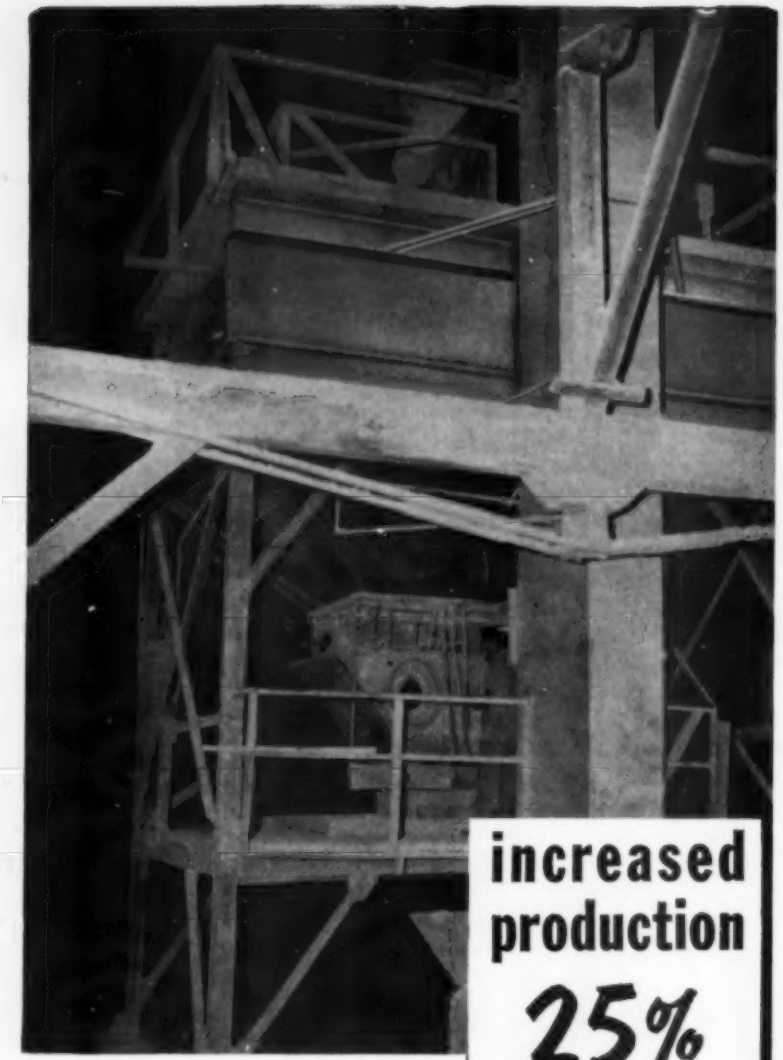

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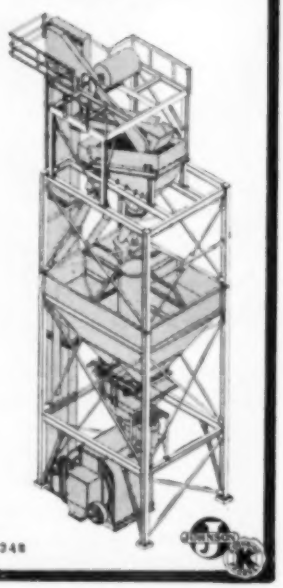

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PEACH SCAB CONTROL

(From Page 60)

that affect the timing of this critical spray. The combinations shown in Table 4 were tested with such contingencies in mind.

Treatment 9 (sulfur at the rate of 6 pounds to 100 gallons of water) gave inferior control. When the amount of sulfur was increased to 8 pounds there was a marked increase in the control obtained and when 12 pounds of sulfur was used in each 100 gallons the control was equal to that obtained with a full schedule of six applications of sulfur at the rate of 6 pounds to 100 gallons.

Effectiveness of New Materials for Peach Scab Control: Endomycin, an antibiotic material reputed to have antifungal properties, and pyridimethione, an organic compound, were used in a full-season schedule of six applications. A sulfur-dichlone mixture was used in Plot 29 in the first three sprays followed by three applications of sulfur.

Endomycin and pyridimethione gave no indication of being useful for the control of peach scab (Table 5). Since the sulfur-dichlone mixture was used only in the three early sprays, its effect on scab control was not effectively tested in Plot 29.

Conclusions: The results of one season's work rarely justify drawing any positive conclusions. However, the control of the peach scab has been no problem for many years. The results obtained in the various tests enumerated in this paper are in line with the general body of knowledge that has accumulated for many years. Conclusions on '54 tests follow:

(1) The importance of a sulfur spray applied approximately 4 to 6 weeks after petal fall is redemonstrated.

(2) Peach scab can be controlled with sulfur sprays. It is not necessary to jeopardize the effectiveness of new organic insecticides by adding lime to the sulfur sprays.

(3) Lime used alone gave no indication of being of value for the control of peach scab.

Table 1. Effect of time and number of sulfur sprays on control of peach scab.

Plot No.	Spray material and concentration	Spray Applications * Petal fall (March 22)	Shuck split (April 6)	Second cover (April 15)	Third cover (April 26)	Preharvest May 18	Preharvest June 1	Fruits with scab (Percent)	Mean equivalent angle
1.	None (check)	....	....	....	....	....	....	98	82.95
2.	Sulfur 6-100	XXX	....	....	....	....	....	98	84.11
3.	"	....	XXX	....	....	....	....	97	81.49
4.	"	....	....	XXX	....	....	....	96	79.00
5.	"	....	....	....	XXX	....	....	47	43.16
6.	"	....	....	....	....	XXX	....	87	69.27
7.	"	....	....	....	....	....	XXX	91	72.33
8.	"	....	....	XXX	....	XXX	....	66	54.66
9.	"	....	....	XXX	....	XXX	XXX	47	43.04
10.	"	....	....	XXX	XXX	XXX	....	8	15.82
11.	"	....	....	XXX	XXX	XXX	XXX	11	18.58
12.	"	....	XXX	XXX	XXX	....	....	16	23.43
13.	"	XXX	....	XXX	XXX	XXX	XXX	13	21.09
14.	"	XXX	XXX	....	XXX	XXX	XXX	5	12.64
15.	"	XXX	XXX	XXX	....	XXX	XXX	27	30.48
16.	"	XXX	XXX	XXX	XXX	....	XXX	16	22.92
17.	"	XXX	XXX	XXX	XXX	XXX	....	10	18.15
18.	"	XXX	XXX	XXX	XXX	XXX	XXX	2	7.45
L. S. D. 5%									6.48
L. S. D. 1%									8.61

*XXX = Indicated spray applied; ....spray not applied.

(4) The addition of lead arsenate to lime enhanced the control of the scab. This mild fungicidal action of lead arsenate has been recognized for many years.

(5) The addition of zinc sulfate to the lead arsenate and lime mixture adversely affected the control of scab. However, a mixture of zinc sulfate and lime was superior to lime alone.

(6) If through unfavorable circumstances it is not possible to apply the critical 4 to 6 week spray, the results obtained in 1954 suggest that increasing the amount of sulfur from 6 to 12 pounds per 100 gallons of water will give satisfactory control. Environmental conditions fluctuate from season to season and it is conceivable that in some years conditions might be so favorable for scab development that even 12 pounds per 100 gallons would not give satisfactory peach scab control.

(7) Neither endomycin nor pyridimethione appeared promising for the control of peach scab.★★

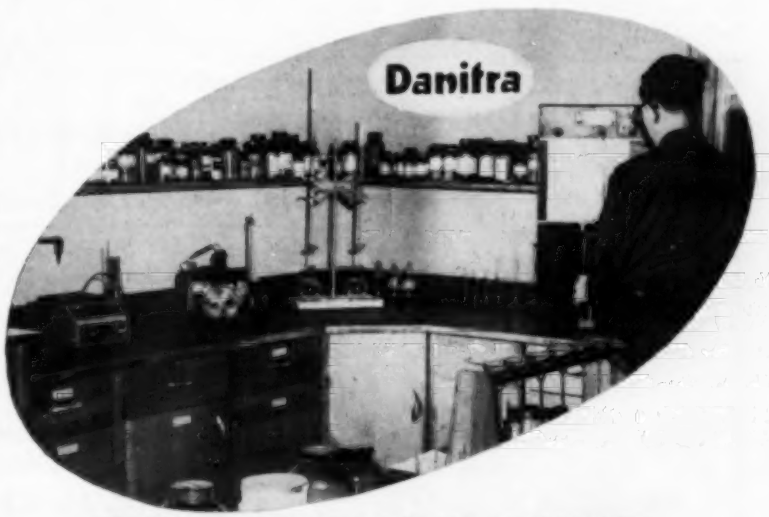

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Table 2. Effect on scab control of various chemicals applied only during the scab infection period.

Plot No.	Spray material and concentration		Spray Applications [a] Petal fall (March 22)	Shuck split (April 6)	Second cover (April 15)	Third cover (April 26)	Preharvest May 18	Preharvest June 1	Fruits with scab (Percent)
10.	Sulfur	6-100	——	——	XXX	XXX	XXX	——	8
23.	Lime	8-100	——	——	XXX	XXX	XXX	——	88
	Lime	8-100	.....	.....	XXX	XXX	XXX	.....	33
24.	Lead arsenate	2-100							
	Lime	8-100	.....	.....	XXX	XXX	XXX	.....	51
25.	Zinc sulfate	4-100							
	Lime	8-100	.....	.....	XXX	XXX	XXX	.....	51
26.	Lead arsenate	2-100							
	Zinc sulfate	4-100							

[a]XXX indicated spray applied; ....., spray not applied.

Table 3. Effect of materials added to sulfur[a] sprays on control of peach scab.

Plot No.	Supplemental Spray material and concentration		Spray Applications [b] Petal fall (March 22)	Shuck split (April 6)	Second cover (April 15)	Third cover (April 26)	Preharvest May 18	Preharvest June 1	Fruits with scab (Percent)
19.	Lime	8-100	——	——	XXX	——	XXX	——	1
20.	Lime	8-100							
	Lead arsenate	2-100	——	——	XXX	——	XXX	——	2
	Lime	8-100							
21.	Lead arsenate	2-100	——	——	XXX	——	XXX	——	5
	Zinc sulfate	4-100							
	Lime	8-100							
22.	Lead arsenate	2-100	——	——	XXX	XXX	——	——	17
	Zinc sulfate	4-100							

[a]All trees in Plots 19 and 22 received the full season schedule of 6 sulfur sprays in addition to the treatments listed in Column 2.
[b]XXX, indicated spray applied; ....., spray not applied.

Table 4. Effect of increased dosages of sulfur on peach scab control when the critical (4 to 6 weeks after petal fall) spray is omitted.

Plot No.	Spray material and concentration		Spray Applications [a] Petal fall (March 22)	Shuck split (April 6)	Second cover (April 15)	Third cover (April 26)	Preharvest May 18	Preharvest June 1	Fruits with scab (Percent)
9.	Sulfur	6-100	——	——	XXX	——	XXX	XXX	47
30.	Sulfur	8-100	——	——	XXX	——	XXX	XXX	19
31.	Sulfur	12-100	——	——	XXX	——	XXX	XXX	1

[a]XXX, indicated spray applied; ....., spray not applied.

Table 5. Effectiveness of new materials for peach scab control.

Plot No.	Spray material and concentration	Spray Applications [a] Petal fall (March 22)	Shuck split (April 6)	Second cover (April 15)	Third cover (April 26)	Preharvest May 18	Preharvest June 1	Fruits scab with (Percent)
1.	None (check)	——	——	——	——	——	——	98
27.	Endomycin 100 p. p. m.	XXX	XXX	XXX	XXX	XXX	XXX	37
28.	Pyridimethione 100 p. p. m.	XXX	XXX	XXX	XXX	XXX	XXX	95
29.	Sulfur 6-100							
	Dichlone 4 ozs. - 100[b]	XXX	XXX	XXX	XXX	XXX	XXX	3
18.	Sulfur 6-100	XXX	XXX	XXX	XXX	XXX	XXX	2

[a]XXX, indicated spray applied; ....., spray not applied.
[b]Dichlone not used in the last three sprays.

WASHINGTON REPORT

(*From Page 71*)

Advisory Committee and the Grain Research Advisory Committee, both established by the USDA under the Research and Marketing Act.

In its report, the committee sees the need for expanded work to determine the "direct and indirect effect of insecticides, fungicides, and herbicides on soils, plants, and animals." Special attention should be given to residues in or on the edible portions of vegetables and to the effects on chemical compositions and quality, the committee believes.

Other principal production research recommendations of the committee include the following suggestions:

Continue to expand research on nematodes as a limiting factor in vegetable production, emphasizing improvement of preventive measures and chemical control methods.

The Grain Research Advisory Committee cites 37 lines of research needing special attention and attaches special importance to — "means of lessening insect damage to growing grain."

Somewhat related to this problem is a series of continuing conferences going on between a special committee of the USDA and the Food & Drug Administration, which are expected to lead to the establishment of tolerances for grain fumigants and other chemicals used for the protection of stored grain.

As one USDA official puts it—the grain sanitation pot is still boiling and it could boil over. There are signs that the enforcement of existing standards by the Food & Drug Administration will be rather cautious. At the same time, it is not a safe assumption that Food & Drug will restrict its activities to merely "barking." Officials can take a big "bite" if they wish.

FUNGICIDE TESTS

(*From Page 42*)

Material	Chemical Name of Active Ingredient
Tersan 75 (D)	see thiram
Thiolutin	——
Tritisan	pentachloronitrobenzene
Velsicol Comp. (W)	*N*-ethylmercuritetrahydromethano hexachlorophthalimide
Verdasan (PP)	an organic mercury compound
Vitrioline	——
MG. 1	malachite green on an absorbent base
VC 1-13 (W)	——
8HQB	8-hydroxyquinoline benzoate
MCW-84	——
PS-242	——
DuPont 244 (D)	phenylmercury acetate; ethylmercury acetate
DuPont 364 (D)	same as duPont 244
B856C	——
A-935 (G)	a chromium complex
Experimental Mercury, Form 1	mercuric chloride; mercurous chloride
Experimental Mercury, Form B	——
Experimental Mercury, Form D	——
Bloomocide (X)	——
Crag Fungicide 7443 (B)	——
Emmi 10% Emulsion (Aa)	reaction product of potassium dichromate, copper sulfate, and arsenic pentoxide
Emmi 90% WP (Aa)	same as Emmi 10% Emulsion
End-O-Pest Rose Dust (X)	see Captan, Karathane
Liquid Seed Disinfectant (D)	phenyl mercury acetate; ethyl-mercury acetate
Natriphene (X)	sodium *o*-phenylphenoxide
New Improved Ceresan (D)	ethylmercury phosphate
XSF No. 3 (X)	——
——	peracetic acid (34)

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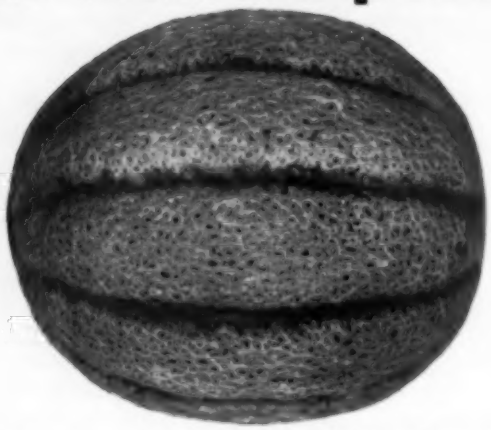
NEWS FROM NAUGATUCK

ALANAP®-1

Weed Killer

saves $35 to $150 per acre



Extensive field use proves that Naugatuck's new herbicide, Alanap-1, can save growers of cucumbers, melons and squash countless dollars by practically eliminating hand weeding.

One experiment revealed that cucurbit yields were actually doubled by a pre-emergence application of Alanap-1. "Plants in untreated rows were severely stunted by weed competition before the fields could be cultivated and hoed, whereas treated rows were still not suffering...two months after planting."

As a pre- or post-emergence weed killer, Alanap-1 gives excellent control of a variety of annual weeds, is non-hazardous to humans, animals, easy to apply, low in cost, and safe on recommended crops which now include asparagus.

Naugatuck Chemical

Division of United States Rubber Company
Naugatuck, Connecticut

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

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FILL IN COUPON FOR FAST ACTION—EXPERT ADVICE

WHAT CROP?_____

Weeds to control?_____

Acreage_____

NAME_____

ADDRESS_____ CITY_____ STATE_____

The USDA is now issuing to state entomologists a series of slides aimed at showing farmers the importance of keeping grain clean and how to do it. These slides, along with suggested script, should be in the hands of entomologists shortly.

* * *

The USDA's work on labelling is due to receive a $75,000 increase in funds. Department officials say the increase is needed because of the added work load resulting from the passage of the "Miller Bill." Laboratory research for this function, headed by W. G. Reed, is carried on at Beltsville, Maryland, and at the USDA's South Building.

* * *

Joseph A. Noone, NAC Technical Advisor, is rounding out a most active legislative season which has included intensive field work. Part of his activities have been devoted to opposing "unwarranted" state registration fees. Some of the other proposals in state legislatures which are being opposed are:

1. To require a permit from village marshal before you can sell pesticides.
2. Prevention of the sale of pesticide if in any way injurious.
3. Requiring the seller to make sure the buyer has a permit.
4. Labeling requirements which would only add additional "fine print" to the labels.

It's too early to appraise fully the extent of state legislative action, since the final voting is not completed. However, we'll keep you posted on developments as they occur.

* * *

Winner of the "Miller Bill Sweepstakes" for the top honors as the first chemical to be given a tolerance by the Food & Drug Administration is "SES," (2, 4-dichlorophenoxyethyl-sulfate). "Winning" company is Union Carbide and Carbon Corporation, New York. The prize is six parts per million of SES residues in or on potatoes, peanuts, peanut hulls, and peanut hay. What's more, they're cleared for two parts per million of SES in or on asparagus and strawberries.★★

Food & Drug Commissioner George P. Larrick says in recognition of this historic event that "Establishment of these formal tolerances will help to insure that farmers can produce crops that are free from harmful amounts of the poisonous sprays which are necessary in today's agricultural economy."

This then is the first tangible result to come from informal meetings and discussions begun back in 1947-48. The millions of words that have been spoken or written are now being measured in terms of specific residue tolerances now in the process of being determined for the whole realm of agricultural chemicals in or on raw agricultural products.

Nor is this the end. For while emphasis is currently on fruits and vegetables and grain, you have only to look at the menus in any restaurant to see lists of meats, poultry products, and other commodities where agricultural chemicals of one kind or another enter their production. You'll be hearing more on this in the months ahead.★★

SAFETY PROGRAM

(*From Page 34*)

(c) Plant Inspection
(d) Good Housekeeping
(e) First Aid
(f) Safety Bulletin Boards
(g) Accident Records and Reports

This program is certainly not original, nor is it an untried program. It is working now, not only in this industry, but in many industries, in many states. You can make it work for you.

The Snyder Chemical Company, Inc.
Topeka, Kansas

ACID FORMING FERTILIZER

(*From Page 43*)

"The addition of lime to correct the acidity produced by fertilizers does not offset the differences in the effect of fertilizers on the potash supply of the soil."

"High analysis acid fertilizers and lime can be bought for less than neutral fertilizers, which are made by diluting acid fertilizers with lime."

The U. S. Department of Agriculture *Farmers' Bulletin*, No. 2032 (pp. 25-26) says:

"The tendency of some fertilizers to make the soil more acid should cause little concern where an adequate liming program is followed. For an extreme example, suppose ammonium sulfate, one of the most highly acid-forming fertilizers, is applied at the very heavy rate of 500 pounds per acre. It would take 550 pounds of limestone to overcome the acid-forming tendency of this application. The acid-forming tendencies of mixed fertilizers, even where no attempt has been made by the manufacturer to correct that tendency, are seldom more than a small fraction of that of ammonium sulfate. The farmer must realize that he pays much more for limestone that has been included in a mixed fertilizer to correct its acid-forming tendency than he would have to pay for a little additional lime applied directly to the soil. If a check is kept on the soil acidity and lime is applied when it is needed, the effect of any acid-forming fertilizers that may be used can be largely ignored. Similarly, the effect of the fertilizers that make the soil less acid can be ignored; their effect is too slight to have any significant influence on the liming program."

Dr. F. L. Bentz, Jr., Extension Specialist, University of Maryland, speaking before the National Lime Association on May 3, 1954 said:

"It would appear that the acidity produced by fertilizers is a rather serious problem. However, I think if you will look at the problem a little bit more closely you will realize that it is not quite so serious. If the farmer were to apply 1000 pounds of 10-10-10 fertilizer per acre, the amount of calcium carbonate required to neutralize the acidity of that fertilizer would be about 550 pounds. In a ton of limestone, there would be

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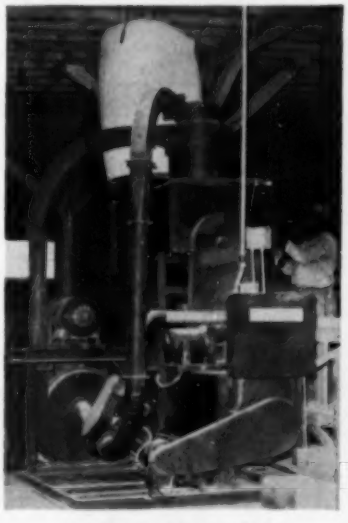

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roughly three and a half times as much calcium carbonate as is actually needed. . . . If a farmer follows a normal liming program, he will more than take care of the acidity of the various fertilizer materials."

Now to give an example: Supposing a 5-10-10 fertilizer is applied at the rate of 1000 pounds per acre. This means, 1000 pounds of 5-10-10 yields 50 pounds of nitrogen.

Since each pound of nitrogen when converted to nitrate requires 3.57 pounds calcium carbonate equivalent. Then, 50 pounds of nitrogen require 50 x 3.57 = 178.5 pounds of calcium carbonate. But, according to the official method, we consider only half of the nitrogen of the fertilizer as being involved. Hence only one half of the 178.5 pounds or 89½ pounds of calcium carbonate equivalent are actually involved. This surely is not a serious degree of acidity to be neutralized by lime.★★

BIRD LOSSES

(*From Page 35*)

smaller quantities of DDT in emulsions.

"Wherever DDT is used, make careful before and after observations of mammals, birds, fishes and other wildlife.

"In the control of early appearing insect pests, apply DDT, if possible, just before the emergence of leaves and the main spring migration of birds; for late appearing pests, delay applications, whenever practicable, past the nesting period of birds. Adjust crop applications and mosquito-control applications so far as possible to avoid the nesting period."

The U. S. Department of Agriculture has used DDT at the rate of 1 pound per acre in its gypsy moth aerial applications without too much damage to other forest life. It is evident that some injury to natural species in the forest and field, as well as the streams may occur from applications of DDT, but literature available seems to point to minimum damage to birds at dosages of 1 pound per acre or less.

The Editors

Fly Control on Livestock

(*From Page 47*)

TABLE 4
Cost of Fly Control Per Animal Per Week

Formulation retail cost/gal.	Dilute rate	Amount applied	Application per week	Spray cost per week*
Oil base $1.75	None	60 ml.	7	$0.19
Water emul. conc. $7.00	1 + 9	946 ml.	1	0.17
Treadle sprayer $10.00	None	1 ml.	28	0.07
Pres. spray $1.50	None	6 gms.	14	0.37
Backrubber $7.00	1 + 4	Varying**	Many	0.02

*Labor and equipment cost not included.
**One 12-15 ft. backrubber services 100 head with initial 1 gal. charge and ½ gal. at two week intervals.

ly used sprays. Application rates vary depending on ingredients. One ounce applications twice a day may be recommended, or two ounces once a day or every other day.

Advantages:

a) These oil base sprays are ready to use. No mixing or diluting is necessary.

b) There is little or no farmer-resistance to the initial cost.

c) An outstanding advantage is that these sprays can provide a complete chemical fly control program. Sprays containing a repellent and toxicant can, if judiciously used, provide knockdown and kill of the flies in the barn and protect animals in the pasture from biting flies.

Disadvantages:

a) Spraying is required once or twice daily at milking time when labor is at a premium.

b) Control of flies in the barn and pasture is temporary. If the amount of active ingredient were increased, additional protection time in the pasture could be obtained.

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liquid handling depends on meters

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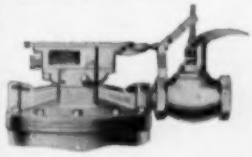
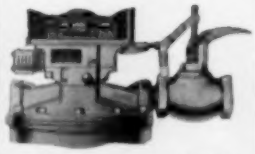


Delivers predetermined quantities up to 10,000 gallons, then shuts off.



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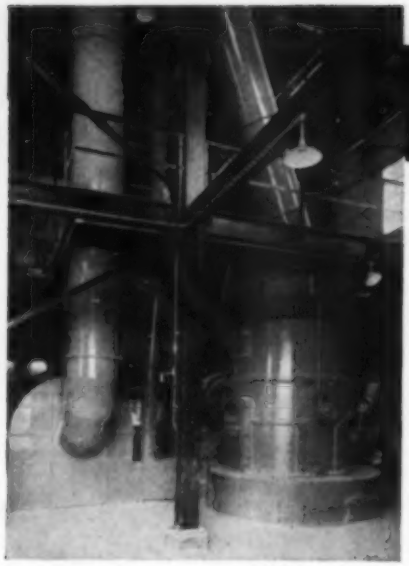

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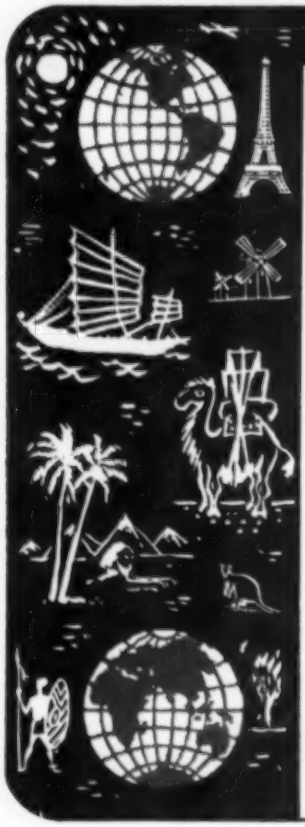

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c) It is recognized that skin irritation may result from over-doses of oil based sprays. Dicke at Wisconsin (12) has shown the production of hyperkeratosis in calves with a topically applied oil base insecticide carrier. Lehman (13) has cautioned against the use of solutions of solid materials in kerosene or petroleum distillates. These findings should help to re-emphasize the proper use and dosage of oil base sprays.

2. *Pressurized sprays*: Repellent-toxicant mixtures can be applied in concentrate form to the animals from a pressurized dispenser. Pressure and valve are adjusted so the concentrate can be sprayed as a fine mist. Particle size varies considerably so some units can be used as aerosols for knockdown and kill of flies around the animals or in the barn. Other units may only be for use on animals. Suggested application rates vary, depending on ingredients and recommended uses of the dispenser.

Advantages:

a) The insecticide concentrate is easy to apply to the animal, as only slight pressure of a finger is needed to release the spray.

b) No spray equipment is needed. No maintenance of equipment is necessary.

c) A pressurized spray container fulfills a need for a specialty use. It can be used to spot-treat single animals, such as show animals and riding horses. The unit can be carried around in a pocket.

Disadvantages:

a) Such a specialty product has limitations as to herd size. It is very useful for a few animals.

b) It can be expensive if recommended dosages are not followed. There is a tendency to over-dose as it appears that sufficient spray is not being applied to the animal.

c) Supplementary house fly control is needed. A true pressurized spray can not be applied as an aerosol to knockdown and kill flies in the barn.

3. *Water emulsifiable concentrates*: Water emulsifiable concentrates are formulated for dilution with water at rates ranging from 1 to 4, to 1 to 39, depending on fly species to be controlled. Usually one pint to one quart of the dilute spray is sufficient to give proper coverage.

Advantages:

a) Water emulsifiable concentrates provide excellent fly control for long periods of time, a few days to two weeks. They are usually formulated so they protect against all biting flies.

b) Water is a safe and inexpensive diluent. It enables the application of large amounts of spray which provide better coverage and therefore better control of all species.

c) In general, applications at three day to two week intervals are satisfactory depending on fly species and population densities.

Disadvantages:

a) Mixing and measuring are required which also require additional time.

b) The initial cost of the concentrate seems to be high to the farmer, who may not consider dilution or application rates.

c) Large volumes of dilute spray are applied. This requires pressure equipment.

d) The water sprays are applied to the animals and do not control flies in the barn.

4a. *Automatic treadle sprayers*: Automatic treadle sprayers are self-treating devices. The animal when passing through a chute, steps on a treadle which forces an insecticide concentrate through one or two nozzles. Concentrates are dispensed as fine mists directly on to the animal at approximate rates of 0.4 to 0.6 ml. per treadle depression.

Advantages:

a) An outstanding advantage of this method is the low labor requirement for spray application. It appeals to the dairyman who does not have the time to do manual spraying. After installation, little labor is needed to control flies on the animals.

b) It is suitable for the treatment of feeder cattle and heifers in pasture lots.

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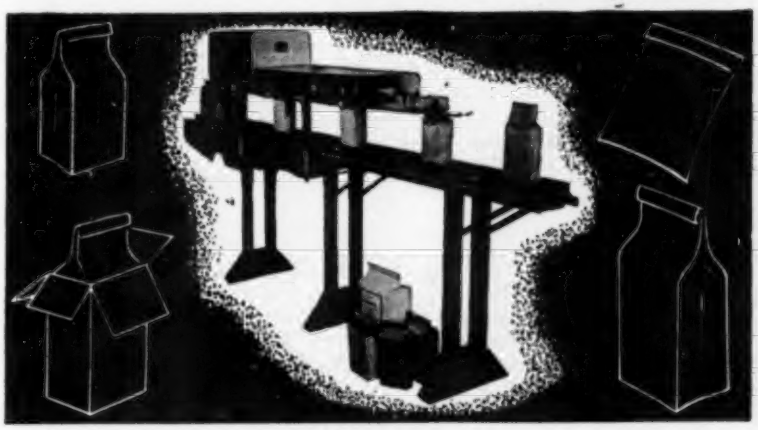

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Bags handled include polyethylene and plioflim lined, polyethylene coated and those with thermoplastic top sealing bands. Simple adjustments for bags of various heights. This model also handles bags which are not heatsealable by gluing the folds.

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Disadvantages:

a) There is farmer resistance to the initial cost of equipment and insecticide concentrate.

b) Minimum coverage for fly control is obtained unless animal management is optimum. The animals should make two to three round trips through the spray unit daily. Windy conditions may keep the fine mist from settling or hitting the animals directly, especially if the sprayer is not hooded properly.

c) Some instances of inadequate stable fly control have been reported because of poor spray coverage of the legs and underline. When the apparatus is set up initially, a period for training the animal to go through the chute is necessary.

d) Supplementary control for house flies in the barn is needed.

4b. *Backrubbers or rubbing posts*: are another example of a self-treating device. A cable is stretched between a post and the ground in such a manner that the animal can treat any part of its body. The wick or cable is charged with insecticide at regular intervals. Materials such as DDT and methoxychlor provide horn fly control. Combinations of a repellent and toxicant extend protection to include stable and house flies.

Advantages:

a) This is also a self-treating device which lowers labor costs for control of flies on the animals.

b) The farmer can construct and install an inexpensive backrubber from materials which he has readily available on the farm. Easily installed, ready made backrubbers are commercially available.

c) Practical control of horn, house, and stable flies is obtained. More information is needed to determine whether horse flies can be repelled.

d) Proper selection of chemicals enables the use of backrubbers for dairy cows as well as range animals.

Disadvantages:

a) Unless the backrubber is located correctly, the animals will not treat themselves and no fly control will result.

b) Good control has resulted when backrubbers are located near water, salt licks or in areas where the animals congregate during the heat of the day.

c) Good fly control will not result unless the backrubber is constructed in such a way that the animal can treat its underline and legs in addition to shoulders and topline.

Summary

An attempt has been made to summarize fly control for the formulations or methods listed in Table 3.

The outstanding advantage of ready-to-use oil sprays is versatility.

Water emulsifiable concentrates provide excellent coverage and protection against all fly species.

Pressurized sprays have the advantage of convenience for small herds.

It should be pointed out that for self-treating devices, treadle sprayers and backrubbers, protection time is proportional to the frequency of self-application. In other words, protection depends on animal training.

Treadle sprayers save labor after initial installation as they are self-treating devices.

Backrubbers are economical and provide practical control.

Cost of Fly Control on Animals

CONTROL of biting flies on livestock is of little value to the farmer if it is not economically feasible or practical. Control and practical aspects have already been discussed. In Table 4 an attempt has been made to give general retail costs of repellent-toxicant formulations for different methods of application. Dilution rates, amounts applied per treatment, and the total amounts per week are indicated. The costs for the insecticide applied by each method are shown. Labor and equipment costs are not included.

Based on the retail costs of the formulations it is easy to rank the methods as to the cost of the insecticide needed to provide control of biting flies. A given set of conditions, however, would have to be set up to

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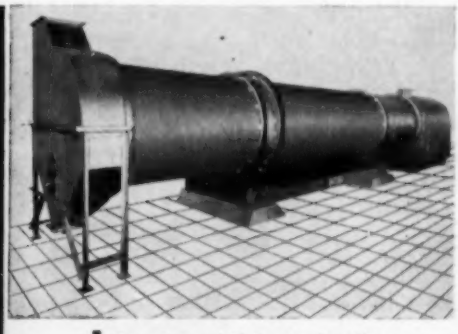

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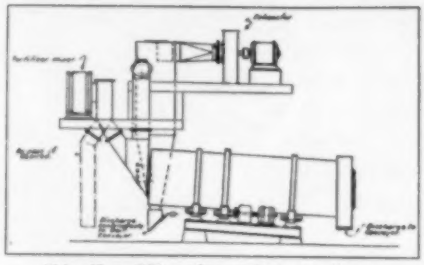

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determine which method would be the most economical for the farmer.

We believe information of the type presented in this and the preceding table could be a valuable tool to help the farmer determine which is the most economical and practical means to control flies on livestock.

Conclusions

CERTAIN general conclusions can be made from the information presented in this paper.

a) It is profitable for the farmer to control biting flies on livestock.

b) Advantages and disadvantages of methods for control have been presented which can help the farmer determine which is the most economical means to control flies under his conditions.

c) Repellent-toxicant combinations are efficient and economical animal protectants.★★

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CONTROL IN INDIA

(*From Page* 53)

Meyr.) infesting coconut palms with indigenous parasites was the first to be undertaken. The results were not satisfactory. In another instance, when the cottony cushion scale (*Icerya purchasi*, M.) which was absent in India was accidentally introduced along with wattle plants from South Africa, the importation, laboratory breeding and liberation of its predator, *Rodolia cardinalis* M. effected remarkably good control.

Considering the lack of roads, limited means of communications, total absence of mechanized agricultural operations, and the economics involved, South India is not too promising an area for the adoption of power operated units for pest control at the present time.

Enthusiasm shown for adoption of pest control measures since 1948 has been gratifying. Although the supplies and formulations of all insecticides were originally in the hands of foreign firms, Indian businesses are now coming to the forefront.★★

BORATE HERBICIDES

(*Continued from Page* 38)

Figure III are, however, misleading as they do not consider the complete elimination of seedlings resulting from the several treatments. Figure

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IV presents the more practical data, being based on plant survival alone. These data show that the addition of the borax equivalent of the complex did not significantly reduce the number of seedlings of Kanota oats. The 2,4-D acid equivalent alone reduced the number of seedlings approximately 50%, but the combined effect of components of the complex reduced the number of seedlings well below levels considered by Crafts and Clearly (2) as constituting satisfactory annual weed control. The reaction of Kanota oat seedlings to the borate/2,4-D complex, when compared to the sum total of the reduction in number of seedlings represented by the data for borax or 2,4-D acid, alone, would be considered by some investigators as demonstrating synergistic action by the combination. However, rather than use the term "synergism", it would be preferable to have the additional increment in herbicidal effectiveness of the complex considered as resulting from a planned conservation of the 2,4-D resulting from the biostatic activity of the borate addition to the complex.

Figure V well illustrates the appearance of plants in a test treatment from which data of figures III or IV were derived, and shows the increased herbicidal effectiveness of the combination of ingredients included in the experimental complex under consideration.

In general, in the use of rates of application of 2,4-D equivalent to that under consideration here, we must, of necessity, attain control over a much longer period than the 30 days represented by Figures III and IV. The consistent extension of the herbicidal qualities that have been observed in greenhouses and field tests with borate organic herbicidal complexes, such as DB-Granular, are illustrated in Figures VI and VII. In the case of the experiment illustrated by Figure VI, standard Army bread pans were used for pots so that there would be no loss of the herbicidal compounds by leaching below the normal soil depth of oat roots. In this situation, loss of the herbicidal compounds can occur only through breakdown by chemical or biological agents, or the materials may be occluded and sequestered by colloidal fractions in the soil and rendered unavailable to the plant roots. At the end of the third consecutive planting, with applications of the herbicidal materials only at the time of first planting, it was evident that while sufficient 2,4-D yet remained in the soil to eliminate seedlings of mustard, the Kanota oat seedlings were surviving fairly well, even at the highest rate, which received approximately 66 lbs. per acre of 2,4-D acid equivalent. The plots which received the combination of the ingredients in the complex, at 1 lb. and 2 lbs. equivalent per 100 sq. ft. showed only 30% stand of oats with approximately 30% of growth vigor for the 1 lb. rate and approximately 15% stand, 10% growth vigor for the 2 lb. rate at the end of 75 days or middle of the third consecutive planting. At the end of the third consecutive planting, the plants receiving the 2 lb. per 100 sq. ft. treatment were completely dead; whereas, plants treated with the lower rate of the complex showed less than 10% survival with practically no root development on the few plants remaining.

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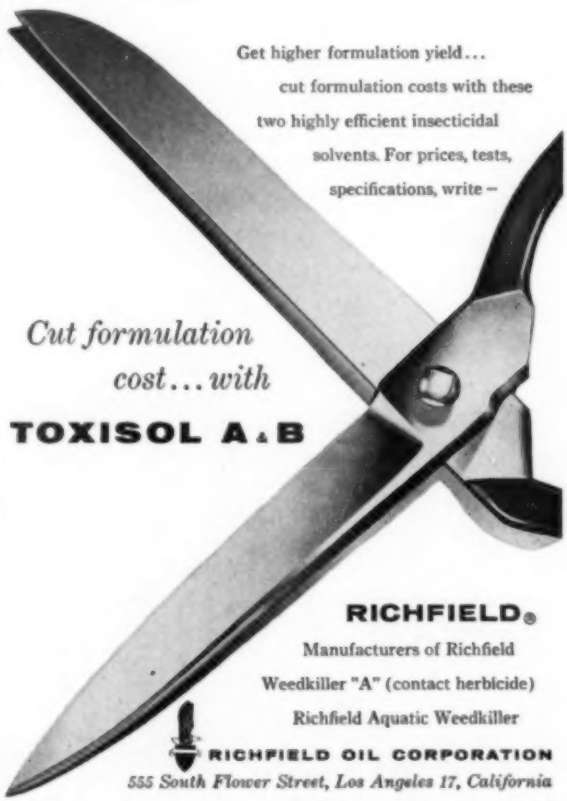

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Tale Ends

"How much Poison Are We Eating?" is the title of a feature article in the April issue of *Harper's Magazine*,—one of those provocative double barrelled titles, i.e. "Have You Stopped Beating Your Wife?"

In a determined effort to tell both sides of the story, the author suggests in one breath that long continued doses of small quantities of insecticides may cause cancer, while in the next he recalls that DDT has saved thousands of lives and that "no case of human death as a result of DDT has ever been brought forward."

He is on his weakest ground, it appears to us, when he starts pointing out that "there is a growing group of agricultural experts who feel that too heavy a use of insecticides may lead us into a downward spiral toward disaster. Many of them belong to what is generally known as the Organic Farming school, which holds that healthy plants in naturally fertilized soil can resist insects and disease without the aid of chemicals."

This willingness to accept disciples of the organic farming school as "agricultural experts" strikes us as convincing evidence that the author of this piece may be on the gullible side. The theory that insects and disease germs will not attract healthy plants is a very pretty one. Trouble is it just ain't so, there being no slightest trace of scientific evidence we have seen that healthy plants are any more immune than sickly ones.

AC

Everyone in the agricultural chemicals industry recognizes the value of the Yearbook of Agriculture series of USDA. In addition to all the praise heaped on this year's edition, called "Marketing," by farm and industry leaders, the volume was chosen for its excellent design as one of the "Fifty Books of the Year." The American Institute of Graphic Arts made the selection last month in New York. It is the second time the Government Printing Office has come up with a winner.

AC

Hello and goodbye . . . In March we introduced Scott Runkle as the new public relations director for NACA. It was a short stay for we learn now that he is leaving this post for a job as director of public relations of the Commonwealth of Puerto Rico.

AC

Almost like a "man from outer space," an all-purpose, all-functional unit will be offered the farmer by the Norton-Portland Co., Portland, Me. This complex vehicle performs some ten operations in one pass over the soil. Masterminded by Herman Cohen, the unit is designed for use on even very rough terrain, including brush 4-5 feet high. It pulverizes any rock in the soil, limes the soil, applies dry fertilizers, alone or with nitrogen solutions, or anhydrous ammonia; it also applies soil insecticides, and, or soil fumigants. The unit at the same time lays back the soil and plants the seeds.

Soil as deep as twelve inches may be prepared by this equipment, which is designed to operate at speeds up to 7 miles per hour. Although the machinery has not had its test flight yet, the solo run is scheduled for late April or early May.

AC

Reports from Washington indicate that the Federal Trade Commission is looking at insecticide advertising . . . says many ads mislead people, leading them to believe the products kill all bugs . . . so some ad copy may have to be toned down.

Look, No Hands!

SURE, you can ride a bicycle no hands, maybe you can light a fire without matches — or perhaps run your sales figures up without advertising.

But why try to do everything the hard way?

The tried and tested method of paving the way for your salesmen, making their job easier and more productive when they finally get in to see the prospects, is to soften them up in advance with an effective advertising program. And no medium can do the job as well for you in the agricultural chemicals field as

AGRICULTURAL CHEMICALS

P. O. BOX 31 **CALDWELL, N. J.**

Member Audit Bureau of Circulations

Why MALATHION is such a useful insecticide

Protects fruit, vegetable and field crops against aphids *and* mites and more than 75 other insect pests.

Protects ornamentals against almost *every* major pest.

Because malathion does so many different jobs...

Kills DDT-resistant flies and fly maggots, too—quickly, economically, with long residual kill.

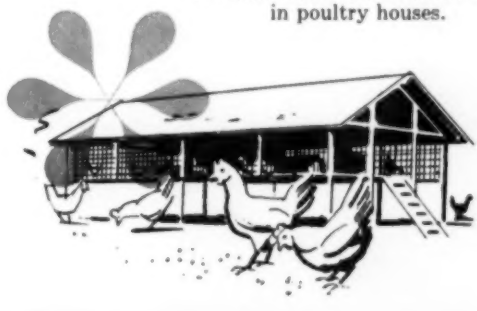
Because malathion offers so many advantages in use

Malathion is the *only* phosphate insecticide combining a wide margin of safety in handling with superior insect control. Malathion residues on crops grown outdoors disappear quickly. And malathion is compatible with most insecticides and fungicides.

DISTRIBUTORS AND DEALERS: Sales of malathion insecticides are rising rapidly and steadily. Farmers all over the country are adopting them enthusiastically. So take advantage of the profit opportunity offered you by this versatile insecticide. Consult your regular source of supply.

Malathion insecticides are formulated by well-known manufacturers (under their own trade names) in wettable powder, emulsifiable liquid, dust and baits to fill every need. American Cyanamid Company makes only technical malathion.

Kills chicken mites as well as flies in poultry houses.



AMERICAN Cyanamid COMPANY

AGRICULTURAL CHEMICALS DIVISION

30 Rockefeller Plaza, New York 20, N. Y.

FAIRFIELD CHEMICALS

TECHNICAL DATA

FAIRFIELD CHEMICAL DIVISION

Food Machinery and Chemical Corporation

420 Lexington Avenue, New York, N. Y.

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Group I

(Pyrenone*)

*Reg. U.S. Pat. Off.

No Insecticide Manufacturer should be without these handy data sheets

Each of these informative sheets — yours for the asking — is a reservoir of information on product and end-use data for formulators of all types of insecticides. You'll find typical formulations, sample label statements and other material about Pyrenone* and related chemicals used in insecticides for diversified purposes. These include dairy, livestock, food processing, grain storage, aerosols and other fields. Also there are data sheets on herbicides. For your free information simply circle the sheets desired in the coupon, attach to your letterhead and mail today.

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1. Herbicides
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3. Insect Repellent
4. Pet Shampoo
5. Horticultural Spray
6. Roach and Ant Sprays
7. Pet Sprays
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9. Livestock Sprays
10. CPR Dusts & Sprays
11. Food Plant, Institution and Industrial Sprays
12. Insect-proofing Packages
13. Automatic Cattle Sprayers

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